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A Weekly Journal Devoted to Industrial and Engineering Chemistry

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No. 1409

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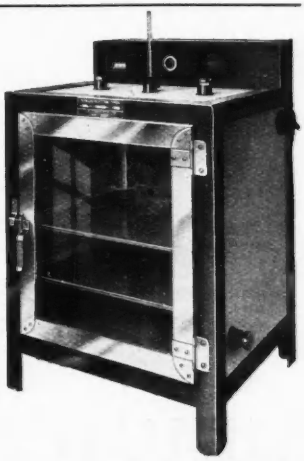

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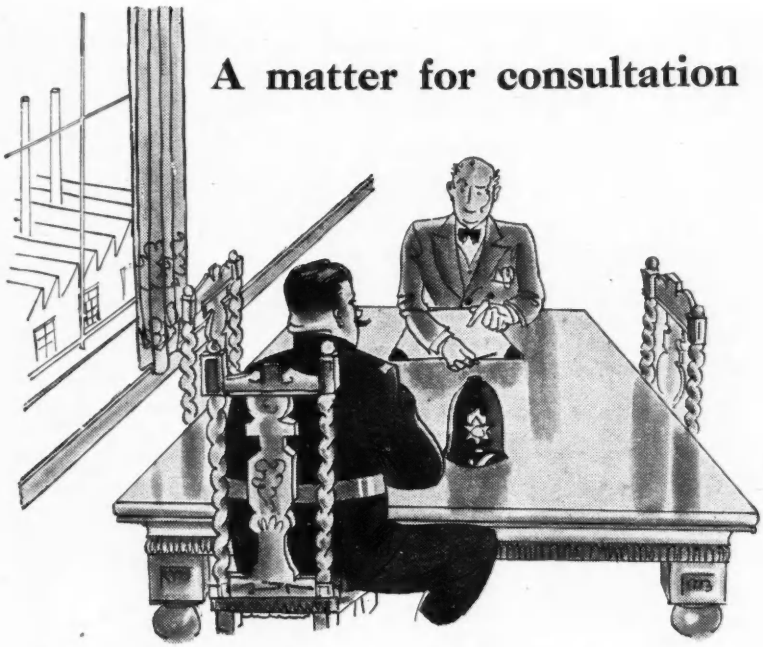

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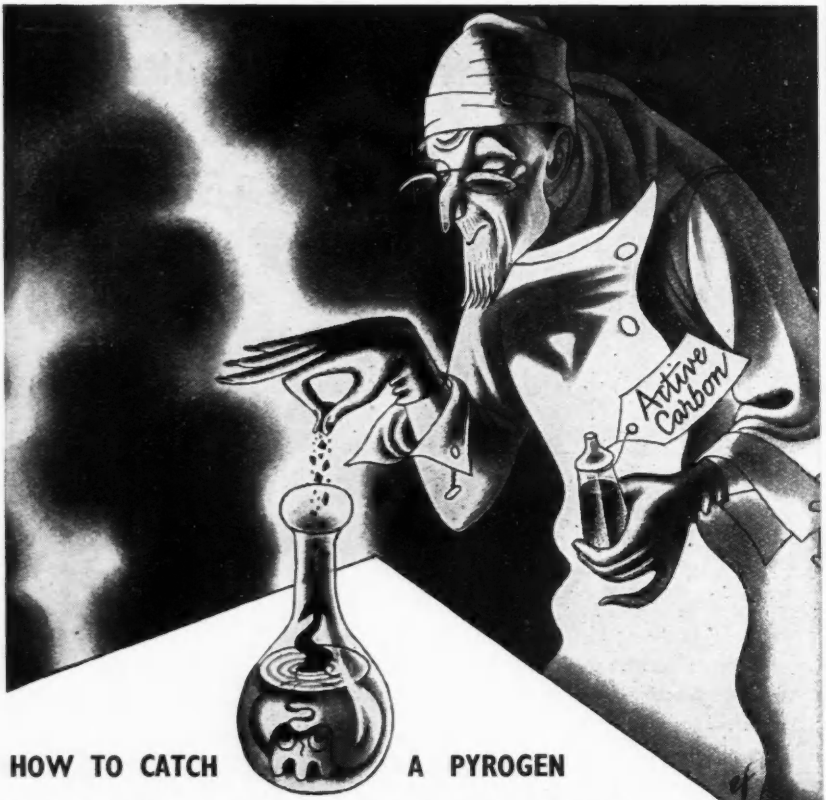

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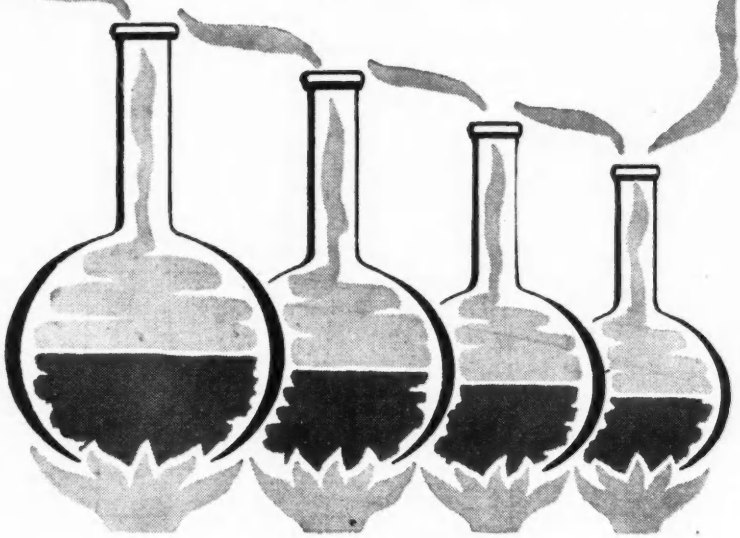

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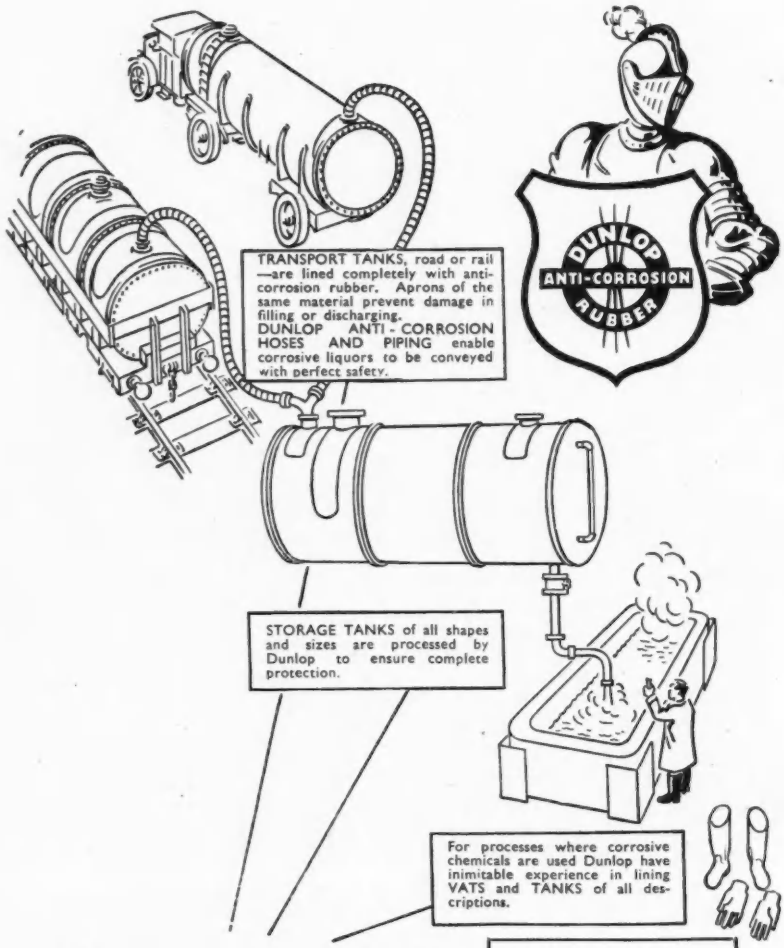

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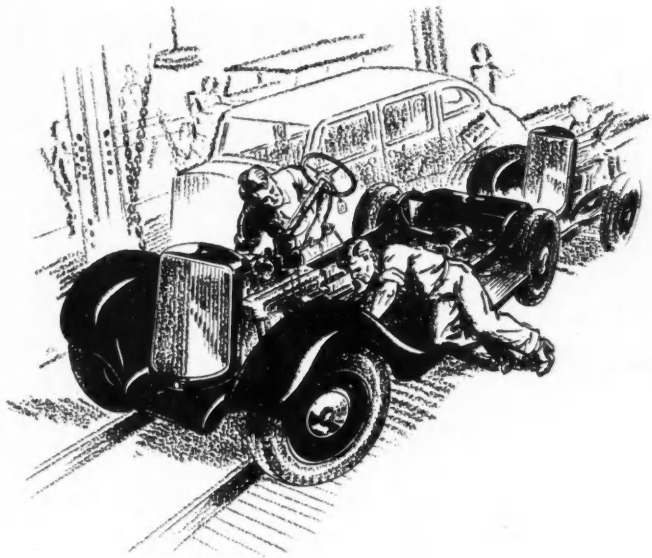

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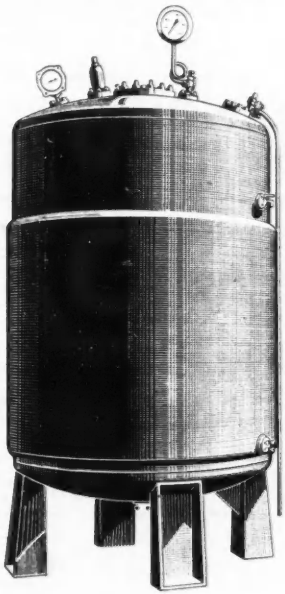

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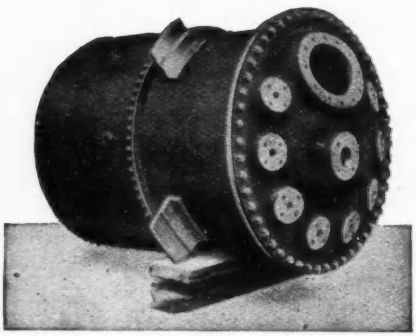

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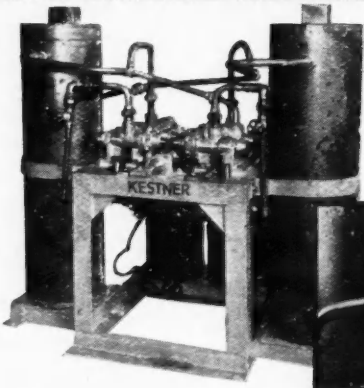

Illustration left: Drying Unit.

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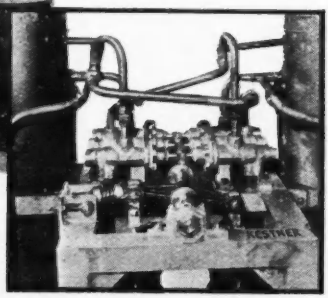

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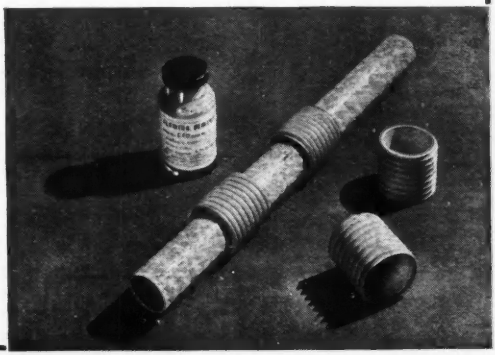

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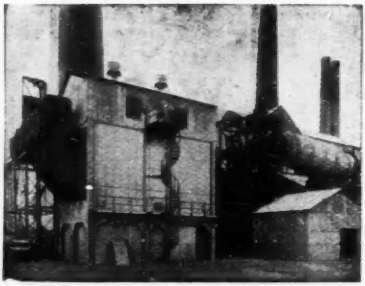

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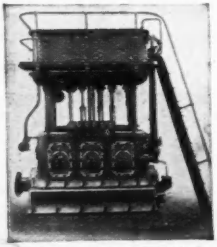

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June 29, 1946

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British Industrial Research

LORD WOOLTON, out of his wide industrial and political experience, has put his finger upon the brake that is retarding industry. He has called upon the Government to free trade and industry from the grip of bureaucratic control: "Break the fetters, free Britain's spirit, encourage her instinct for enterprise and she will lead Europe in peace as she saved her in war." Nationalisation and Government control are destructive of the spirit of adventure and self-reliance upon which Britain's greatness has been founded. There can be no efficiency where individual responsibility and decisions are absent. While we despair of seeing our bonds broken by the present Government, it is good that Lord Woolton's trumpet call to better conditions should have been made.

There has lately come into our possession a book written by Sir H. Frank Heath and Mr. A. L. Hetherington, entitled "Industrial Research and Development." (Faber and Faber, 375 pp., 25s. net), which illustrates Lord Woolton's comments and points a moral to his tale. This book is not for the expert. It is not intended to be. It is, frankly, neither written by experts nor intended to be read by experts. It is intended for the intelligent layman who has not grasped the large part—through private enterprise, be it noted—which this country has played in the establishment of what are now known as modern conditions of life. It is intended to show to those in one industrial field, which they probably know inside out, what is done in other fields, of which they probably know very little. It gives a review of what is known as the "productive industries," a term which includes all industries making consumer or capital goods. It tells something of the methods used in those industries and it shows how scientific research and development have contributed and are contributing to their effectiveness both present and future. It shows how research is being conducted in many industries and it gives an account of some of the research establishments of the D.S.I.R. The universities, the technical colleges, and the learned bodies are briefly described. A few pages are devoted to general factors affecting industrial progress, such as taxation, industrial design, standardisation and scientific personnel. The purpose, in short, is to give the ordinary reader in simple language some account of the vast ramifications of science in industry, and to show that both in discovery and application Britain has played a very important part, a part that is at least

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equal to that of any other nation. We do not intend to follow the authors through the pages of their book. There are many facts which will interest everyone and so far as we are in a position to judge, the facts are sound even if they are not very detailed. We are interested primarily in the authors' approach to their subject. The change in the conditions under which we live has been profound over the last 200 years. It has been very great over the last 100 years. The authors point out that it has arisen in the first instance through the initiative and research of manufacturing industries with the help of men of inventive genius or of scientific training and imagination. H. A. L. Fisher pointed in his " History of Europe " (Ch. 80, p. 1012) to " the desire of the British industrialist to be free of Government meddling and to be allowed to get rich in his own way." That has been the method hitherto by which we have done so much. The assistance of the inventor and man of science has enabled many British industries to maintain the lead in the markets of the world which the introduction of steam power had first won for them. To-day many of the principles upon which our country waxed great are in disrepute. In certain quarters it is regarded as almost criminal to make profits. To quote the authors of this book: " The seeker after scientific truth enjoys the same thrills and suffers the same disappointments as the explorer, but unlike Columbus, he is not in modern times consigned as a result of his labours to change an obloquy by a Bobadilla appointed by a Government."

The efforts of the scientist and technologist to improve the rate of production have been frowned upon by the short-sighted of all ages. Many a mediæval philosopher went in fear of his life and liberty, and some indeed lost both, for making scientific discoveries in advance of their time. Mankind did not like to have its preconceived beliefs disturbed. Thus it was that the efforts to introduce machinery in the early 19th Century were met by rioting on the part of the employees, and, coming to our own times, we cannot forget how, during the industrial depression of the early 1930's, it was contended that the evils of unemployment were largely due to the zeal of scientists who, by designing improved methods of production, diminished the demand for labour; the authors remind us of the quite serious suggestion that scientific research should take a holiday for a decade. The first advent of a scientific discovery and its development often results in a readjustment of labour and in a readjustment of the policy of the industry concerned or of its competitors. The ultimate result, however, is a higher standard of living, betterment of social conditions and fuller employment.

The scientific and technical men who will read these words will not require to be convinced of the soundness of these views, but it is good that they should be put before the general mass of people. There is too much misunderstanding of scientific research and technical development on the part of the general public and sometimes, it must be confessed, on the part of manufacturers. We believe that industrialists are now fairly fully alive to the need for carrying out development work in this country, though there are a great many exceptions. A passage from the book to which we have referred is worth quoting in this connection: " The industrialist . . . has often been content to purchase a licence to use the latest inventions and discoveries from the foreign patentee because this seems to be the quickest way and therefore the cheapest means of using science for his purposes. But apart from the discouragement this caused to the native inventor and research worker, the effect of this action is to increase the balance of payment due from this country for imports. Moreover, the tendency is encouraged to increase the export of raw materials such as coal—a diminishing asset—or semi-manufactured articles, in order to balance our trade. Our industrial workers to that extent are transferred from the more highly skilled occupations to those involving less training and lower intellectual capacity. In a word, the neglect of scientific research tends to make our people hewers of wood and drawers of water for nations that put more brainwork into their products." This is the soundest of common sense. It is something that should be got over to everyone in this country. The difficulty is that a book of this character costing 25s. is hardly likely to be purchased by the general public. Probably the most that can be hoped is that it is purchased by those who wish to think for themselves and to understand something of the ramifications of industry, and that they will pass on their knowledge to the others.

NOTES AND COMMENTS

Practical Research

THE word research is so frequently used nowadays without a clear conception of its precise meaning on the part of the user, and it is so often glibly put forward as the panacea for all troubles, that it was refreshing to be afforded an opportunity, such as came our way last week, of visiting the National Physical Laboratory, at Teddington, where research is shown as a reality. The visit was one of a series arranged for representatives of the Press; delegates to the Empire Scientific Conference; university staffs; and representatives of Service and industrial organisations, on successive days, and the occasion was the first on which "outsiders" have been permited to enter the laboratory since pre-war days. Those whose first visit it was were agreeably surprised by the extensive nature of the establishment. Originally begun in Bushy House, an old Royal residence granted by the Crown for the purpose, the laboratory now consists of sixteen large buildings and a number of smaller ones, on a site of about 50 acres. Further structural developments are contemplated.

Enthusiastic Workers

MEMBERS of the laboratory staff acted as guides for the parties of visitors and both they and the employees who gave demonstrations of the work now being carried out were most courteous and helpful, especially in answering questions. Visitors must have been particularly struck by the obvious enthusiasm which the workers have for their own particular jobs and the feeling was created that this country need have no qualms about the abilities of its rising generation of research workers. So far as the National Physical Laboratory is concerned, they have plenty of scope, the research work there including most branches of physics, light, electricity and magnetism, radio communication, engineering, mathematics, metallurgy, aeronautics, and ship design in relation to form and propulsion. With very few exceptions, tests of all classes of measuring instruments are undertaken. The special investigations made for firms and other bodies are of a varied character; the laboratory is always ready to give careful consideration to any problems or difficulties which may be submitted to it, and to undertake experiments, when it is thought that with the facilities at its disposal a solution may be found. It was physically impossible, in the course of one comparatively short visit, to see all that we would have wished, but we felt that the time was very well spent and that if similar opportunities could be afforded the general public there would be a better understanding of just what research is and can mean.

Oil and Fat Problem

THE public generally does not realise that the failure of the Indian cereal crops is held to blame for the cut of one-seventh that was imposed in the domestic soap ration last week-end. The exportable surplus of the ground-nut crop from India was expected to be 600,000 tons, equivalent to about 260,000 tons of oil, and Britain's share of this amount, which was allocated to receiving countries by the Combined Food Board, was about 550,000 tons. At the beginning of the year, however, the estimate was reduced, the Indian Government putting it at not more than 300,000 tons, and in April a complete embargo was placed on exports of Indian ground-nuts and rape-seed. Consequently, there is a deficiency of about 130,000 tons of oil, and so far it has not been found possible to make up this deficiency from other producing areas. The announcement that the Secretary for the Colonies has arranged for an immediate investigation into the practicability of the large-scale production of ground-nuts in East Africa, particularly in Tanganyika, is welcome, and it is to be hoped that the authorities will not overlook the fact that, as announced in our news columns, it is expected that experiments in oil-seed production on British farms will lead to large-scale developments. Further reference to this question is also made in the review we publish this week of *Sunflower: for Food, Fodder and Fertility*, by E. F. Hurt, and in Parliamentary Topics.

The Movement of Scientists

ONE type of travel that became easier than usual, oddly enough, during the war, was the movement of scientists within the British Empire and, to some extent, outside it. This happy state of affairs was attained through the efforts of the British Scientific Liaison Offices which were established in various places; and the continuation and extension of these offices in

the service of the peace-time scientific community was one suggestion that was made at a recent session of the Royal Society's Empire Scientific Conference. The general subject under discussion was the interchange of scientists throughout the Empire, and it seemed universally agreed that some sort of central fund was needed to enable both senior scientists and more junior graduates to obtain experience in universities and scientific institutions overseas. For teaching staffs and Government research workers a system of leave for study and research was agreed to be desirable—a system, be it said, which has long been in force in the United States in the form of the "sabbatical year." Many speakers from overseas expressed the opinion that they would value short visits from leading men in various branches of science, especially as workers in certain Colonies have felt themselves completely isolated from discussions with colleagues. Of paramount importance, it would appear, is the provision of research grants for the purpose of financing these and similar movements, and in the meantime it is proposed that a Commonwealth centre should be established for providing information about existing facilities and requirements of personnel. It is understood that we are to hear more about this before the conference ends; we shall welcome the fullest discussion, as this will undoubtedly be a step towards preserving the pre-eminence of British science.

Anglo-American Friendship

IN its May issue, a copy of which reached us the other day, one of our American contemporaries, *Chemical and Metallurgical Engineering*, offers some comments on Anglo-American friendship which make very pleasant reading, so much so that we feel they are well worth reproducing, at least in part. "A year ago," it points out, "several hundred American chemists, engineers and technologists found themselves in London, working closely with their British counterparts in science and industry. We had a common objective in helping to win the war, and, we hoped, the peace that is yet to come. As we worked together we had our little differences and disputes, but there was always a sympathetic understanding and an ardent desire to carry over those Anglo-American friendships into the post-war world. Lately there have been opportunities for many of us to renew some of those acquaintances and to strengthen already friendly relations with our chemical brothers from overseas. Sir Ian M. Heilbron, the distinguished professor from the Imperial College of Science and Technology, came from London to receive the 1946 award of the Priestley Medal of the American Chemical Society. The international president of the Society of Chemical Industry, Dr. Eric K. Rideal, has been the honoured guest of both the American and Canadian sections of the S.C.I. Dr. D. W. Kent-Jones, the eminent English authority on flour milling, is here to talk to the cereal chemists at Niagara Falls, Ont., on the new extraction procedures in that industry. In July we are sending past-president Wallace P. Cohoe to receive the Messel Medal of the S.C.I., while the American Section's honorary secretary, Cyril S. Kimball, is to become a vice-president of the parent society. Both of our nations, we hope, stand to benefit by this international exchange of science and scientists."

Real Community of Interests

"IF we are to continue to contribute our share toward shaping a real community of interests in this troubled world," the article continues, "there is a big advantage in starting with the British. As President Rideal reminded us in New York last month, 'the ties of a common language, a common law and a common philosophy are greatly strengthened when in addition we have ties of common interest in a common science.' Certainly, the English-speaking peoples of the world now have their great opportunity to work together—as a progressive force for international co-operation. We have much to learn from each other. We like to think, for example, of American enterprise and risk-taking in technology and industry, and to contrast it with the caution and conservatism of the average British businessman. Yet so often, at least in our experience, we find the Englishman with the sounder concept of economics and the better knowledge of world affairs. A background of centuries of world thinking promotes the long-term viewpoint of the investor which compares none too favourably with the opportunistic, short-term approach of the gambler. A wag friend of ours—an Englishman, too—remarked during his visit here that 'America prospers from an economy of waste, while Britain suffers from a waste of economy.'"

Utilisation of Kiri

An Alternative Source of Lac Resin

by B. S. GIDVANI, D.I.C., Ph.D., F.R.I.C., A.M.I.Chem.E., and N. R. KAMATH, B.Sc. (Tech).

IN the manufacture of shellac in India by the indigeous but ingenious process of hot-filtration through cloth bags, an appreciable portion of the lac resin mixed with impurities is left in the bags. The residue so left is technically known as kiri. Although a small quantity of kiri is utilised in the preparation of cements and adhesives, by far the greater portion of it is treated as a waste product.

In the years before the last war, Germany was almost the sole purchaser of kiri; there are reasons to believe that the Germans were extracting the resin from it by means of alcohol and marketing the recovered lac as garnet shellac. Occasionally the alcoholic solution itself was supplied as a high grade shellac varnish. The cessation of exports to Germany since late 1939 has resulted in accumulation of large quantities of kiri in India, available at a fairly low price. On the basis of present shellac prices, the working-up of kiri offers an attractive proposition and methods suggested below are likely to prove profitable.

Characteristics of Kiri

Kiri is usually marketed in the form of hard, somewhat tough but brittle chunks, 6-8 in. square and about an inch thick. Kiri may or may not contain rosin, orpiment, and other materials that are sometimes added in the manufacture of shellac, but a material free from these adulterants is to be preferred. The resin content of kiri, as determined by extraction with cold industrial alcohol, varies from 30 to 65 per cent., 50 per cent. being the average. The resin isolated from alcohol solution has an acid value of 60 to 65 and a colour index of 45 to 50 on the iodine scale. It has a polymerisation time of 15 to 17 minutes at 150° C. and no flow at 105° C.; the resin only softens and sets to a melt.

The ether-soluble content of this resin is only about 5 to 10 per cent. as compared with 30 per cent. in normal shellac. This may account for the low acid value and probably to some extent for the poor thermal properties of the resin. The absence of fluidity and the reduced polymerisation time, however, are believed to be due mainly to the heat-treatment which kiri receives during the manufacture of shellac. Polymerisation and possibly some aggregation, with consequent increase in the molecular complexity of the lac resin, would occur in such circumstances. The possibility of restoring the fluidity by suitable chemical or physical methods has therefore been investigated.

Methods suggested previously for depolymerising shellac are based on treatments with either alkalis[1], steam under pressure[2], or formic or glacial acetic acids.[3]

Treatment with equivalent quantities of alkalis, such as sodium carbonate and sodium hydroxide, which has proved successful in reconditioning old and blitzed lacs, does not give any improvement in fluidity or polymerisation time in the case of kiri. Use of larger quantities of these alkalis leads to saponification, and the resulting resin, though having improved fluidity, has an acid value of the order of 90-100.

Effect of Autoclaving

Autoclaving of kiri at pressures up to 10 atmo. does not cause any measurable improvement in the fluidity, and the presence of alkaline or weak acidic catalysts, such as sodium carbonate or sodium hydrogen sulphate, does not appear to affect the results. At higher pressures of 20 to 25 atmo., some increase in the fluidity is obtained, but the resin also shows a high acid value (90 to 110, depending upon the pressure and time) indicating that some hydrolysis has taken place.

Glacial acetic acid dissolves lac readily, even in the cold. When kiri is dissolved in acetic acid, and the resin isolated from the acid solution by precipitation with water, it shows appreciable fluidity. But the product, though having a low acid value of about 60, has a high saponification value (295 to 300) and when the saponified product is steam-distilled in the presence of excess of potassium hydrogen sulphate, acetic acid is obtained in the distillate. The increased fluidity is therefore not due to depolymerisation but to acetylation.

Thus none of the three methods cited above is successful in depolymerising the resin in kiri—secondary reactions, hydrolysis or esterification, taking precedence over the depolymerisation. This is understandable, since lac resin is mainly an ester-condensation derivative of hydroxy acids, the weaker ester links being broken down in preference to the comparatively stronger ether links developed during the heat-polymerisation process. Moreover, the acetic acid, though excellent in peptising an aggregated lac, has really no such effect on the resin in kiri, which is a polymerised (chemical condensation) product.

It may be added that the partially hydro-

lysed resin obtained from kiri, by either alkali or pressure treatment, can be judiciously esterified with a suitable alcohol, and products with good fluidity and reduced acid value, comparable with normal shellacs, can be prepared. They are not, however, "shellacs" in the true sense, and any claims regarding the preparation of lacs made from kiri with good fluidity need to be carefully examined. It is thus clear that the lac resin to be obtained from kiri by the usual extraction processes will have some defects, particularly the low polymerisation time and no flow. However, for certain applications, for instance, when the resin is to be used as a film-forming material, these defects are not of any great importance.

Extraction with Alcohol

The resin from kiri can be extracted with either industrial alcohol or aqueous solutions of alkalis. Extraction with alcohol is best carried out in a Soxhlet type of extractor. Kiri is first crushed to about 20-mesh and packed in a canvas bag, which is then either suspended or held in position by means of a perforated container within the extractor. The quantity of alcohol is so adjusted as to give a final solution of 30 to 40 per cent. resin concentration. Addition of a small quantity of oxalic acid (0.2 g. per litre of alcohol) is found advantageous for minimising esterification of the extracted resin. Extraction in this manner is to be preferred and is likely to prove more economical than extraction in the cold, followed by filtration. The time required for complete extraction of the resin is about 7 to 8 hours. When the extraction is complete, the bags are drained overnight to recover most of the alcohol. The total loss of alcohol is not likely to exceed 2 per cent. with the temperature conditions prevailing in this country.

The alcoholic solution of the resin is of garnet colour and may be marketed as a good grade varnish. It is, however, advisable to incorporate a suitable plasticiser in the varnish as flexibility of films from the original varnish is generally lower than that of ordinary shellac films. Methyl *cyclo*-hexanol phthalate is by far the most suitable general-purpose plasticiser for shellac and addition of about 5 per cent., based on the resin content of the varnish, is found adequate for most purposes.

The films from such a plasticised kiri resin solution have as good properties as those from the usual commercial grades of shellac, excepting that they are slightly slower in drying, but their ultimate hardness and resiliency are even superior. Some alcoholic solutions of kiri may have a characteristic smell which can be easily masked by the addition of a small quantity of a fragrant gum, such as gum benzoin, or a fragrant aromatic balsam, without in any way affecting the film properties.

The colour of the resin solution is rather intense, but if necessary it can be reduced considerably by treatment with activated carbon. The degree of decolorisation is affected by temperature and presence of impurities. Refluxing the resin solution with activated charcoal gives the best results, but under these conditions the charcoal has a tendency to crumble, giving a colloidal suspension of carbon which passes through even four layers of filter paper, and settles out very slowly on prolonged storage. Laboratory experiments, however, have shown that satisfactory decolorisation can be obtained by allowing the alcoholic resin solution, previously heated to 70 to 75° C., to flow down a tower packed with activated carbon resting on a half-inch thick bed of diatomaceous earth such as kieselguhr. The temperature of the carbon-tower is maintained at about 70° C. by circulating hot water around it.

Materials such as orpiment (As_2S_3) when present in the resin solution poison the charcoal to some extent, and if the treatment is carried out batch-wise no decolorisation may be obtained with the first treatment. Decolorisation can, however, be obtained by repeating the operation a second, and, if necessary, a third time. When the solutions are to be decolorised, it is desirable that kiri be free from such impurities. Alternatively, the height and/or the number of decolorising columns will need to be increased in order to obtain the desired degree of decolorisation.

Semi-Continuous Process

A semi-continuous process for the extraction and decolorisation of kiri has been successfully worked out on a laboratory scale and is shown in Fig. 1. Gravity flow is used throughout, and the troublesome operations of filtration and pumping of the resin solution have both been entirely eliminated. The process is simple and shows considerable promise, but pilot-plant experiments have to be carried out before any recommendations can be made. When kiri resin solution is to be decolorised, the plasticiser need not be added until after this operation has been completed.

Recovery of the lac resin from the alcoholic solution is not recommended, since the process requires strict technical control and the plant required is rather expensive. Moreover, the lac resin so obtained will be useful mostly as a film-forming material, in which case it will have to be redissolved in alcohol. However, if it is considered necessary to recover the resin for the purpose of marketing it in the form of flakes, the alcohol can be distilled off and the resin sheeted out on rollers in the usual manner. It is, however, suggested that a plasticiser,

such as methyl *cyclo*hexanol phthalate, is incorporated in the resin solution before evaporation of alcohol so that the flakes show the same degree of flexibility as the normal commercial grades of shellac. Thus both garnet and decolorised grades of shellac can be prepared from kiri. The properties of kiri resin flakes can be considerably altered by co-mixing alcoholic solution of good grades of seed lac with kiri resin solution and then removing the alcohol and flaking.

The lac resin from kiri may be extracted with aqueous solutions of alkalis instead of alcohol. Extraction with sodium carbonate is slow and the yield not good. On the other hand, extraction with sodium hydroxide is rapid and the yield quite satisfactory, but the resin is somewhat hydrolysed.

The hydrolysed resin can be used as such in the preparation of adhesives and cements or it may be further modified by esterification with butyl alcohol[1] or ethylene glycol[5], giving products which have been found useful as plasticisers for amino-aldehyde resins, as resin plasticisers in cellulose lacquers and as components of special adhesives for low-temperature work.

When the product is to be used for cements and adhesives, kiri is boiled without any prior crushing, with twice the quantity of 2.5 to 3 per cent. sodium hydroxide solution, for 2 to 3 hours. The hot solution is diluted with water to about 20 per cent. solids, strained through a fine sieve, and the resin isolated by precipitation with dilute sulphuric acid. After washing free from excess acid and other water-soluble materials, the resin is dried by direct heating. A dark red, slightly sticky product in a yield of 75 to 80 per cent. based on the resin content of kiri is obtained. It has an acid value of 90 to 95 per cent., and may be used with confidence in place of hydrolysed lac[6] in cements and adhesives for bonding various similar or dissimilar surfaces. It is also useful for the bonding of mica.

Esterification

Where the product is to be esterified, the strength of the caustic soda solution can be increased to 4.5 per cent. and the period of heating extended to 4 to 6 hours. It is also preferable to filter the solution after cooling. The preparation of the alkyl esters is best carried out by the process described by the authors in a previous communication[4]. Both the butyl and glycol esters of hydrolysed kiri resin have excellent plasticising effect on ethyl cellulose and cellulose nitrate, and compositions resistant to petrol and to water (liquid and vapour), and having good adhesion to all types of surfaces, including those based on polyvinyl derivatives, and low-temperature flexibility, can be prepared.

When an unhydrolysed resin is desired, the extraction of kiri should be carried out by boiling with sodium carbonate solution, and the resin recovered by acidification with dilute sulphuric acid.

The resin obtained by extraction with either sodium carbonate or hydroxide is dark red and may be decolorised by bleaching in the usual manner with sodium hypochlorite.

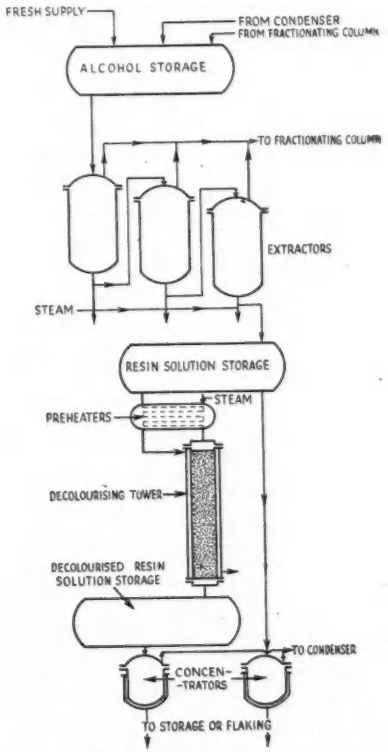

Fig. 1. Self-continuous process for the extraction and decolorisation of kiri.

Bleaching will naturally be carried out in the alkali solution before precipitation with acid. The extent of bleaching, however, is limited, and with the sample of kiri under investigation, the colour index could not be reduced to below 3. Increasing the time of bleaching or the quantity of bleach does not make any perceptible difference in the colour of the final product.

Better results have been claimed when the resin from kiri is first recovered by the alcohol process and then redissolved in an aqueous solution of sodium carbonate for bleaching with sodium hypochlorite[7]. A much whiter lac can be obtained by this method, but it is questionable whether the

extra cost of such an involved procedure would be justified.

Conclusions

The lac resin from kiri can be economically extracted and by means of alcohol and the resulting varnish may be marketed either as such or after decolorisation with activated carbon. Kiri can also be advantageously extracted with aqueous solution of sodium hydroxide and the resulting slightly hydrolysed resin utilised in the preparation of cements, adhesives, and esters. This partially hydrolysed lac is particularly suitable for bonding mica.

Alternatively, the resin may be extracted with an aqueous sodium carbonate solution, but the extraction is rather slow and the yield not so good. The alkali solutions can be bleached in the usual manner, but the degree of bleaching obtained is not as great as with seed lac or shellac.

The lac resin from kiri obtained either by the alcohol or the alkali process is more brittle than ordinary shellac and has inferior thermal properties as indicated by the reduced polymerisation time and lack of flow.

REFERENCES

[1] KAMATH and GIDVANI, *London Shellac Res. Bur.* Tech. Paper No. 25, 1944.
[2] RANGASWAMI and ALDIS, *Indian Lac. Res. Inst.* Bull. No. 19, 1934.
[3] HARRIES and NAGEL, *Wiss. Veroff. Siemens Konz.*, 1923, **3**, 253.
[4] GIDVANI and KAMATH, *Paint Manuf.*, 1945, **15**, 93.
[5] KAMATH, *London Shellac Res. Bur.* Bull. No. 6, 1944.
[6] MURTY, *Plastics*, 1945, **9**, 585.
[7] VENUGOPALAN, RANGANATHAN and ALDIS, *Indian Lac. Res. Inst.*, Research Note No. 14, 1934.

Disposal of Mica Stocks

Arrangement with Government of India

AGREEMENT has now been reached with the Government of India and the United Kingdom mica trade on arrangements for the disposal of the stocks of mica accumulated by the U.K. Government during the war, when, in order to secure the fullest supplies for the military needs of the United Nations, the whole of the Indian output was purchased through a Mica Mission in India. The broad basis of the plan is the gradual marketing of these stocks over a period of years in relation to current sales and without undue interference with current production in India. Subject to the retention of part of the stock in certain categories for the time being as a Government reserve, the arrangements contemplate:

(a) The disposal of the main commercial categories of block and films over varying periods up to five years.

(b) The disposal of the smaller sizes (grade 5 and smaller) of block mica and films, stained and lower, and of the main stocks of loose splittings, as market conditions permit, with a target period of 10 years.

(c) In the case of the lowest quality small grade splittings (3rd quality and 5/6 mixed Madras) there is normally surplus production and the Board of Trade has agreed to withhold these from sales unless new demands arise which enable them to be disposed of in addition to the normal Indian production.

(d) The actual rates of release and the basis on which prices for sales from Government stocks will be fixed, will be determined periodically and announced to the mica trade on the advice of a Mica Disposals Panel.

Sales of mica owned by the U.K. Government will be made through the normal trade channels by Mica Distributors Limited, who will act as the Government's agents.

Atomic Scientists

Association's First Council

AT the inaugural meeting of the Atomic Scientists' Association, held recently at Birmingham under the chairmanship of Professor H. S. W. Massey, the results of elections to the first Council of the Association were announced as follow:

Professor H. S. W. Massey, Dr. E. H. S. Burhop, and Dr. W. J. Arrol, of London University; Professor M. L. Oliphant and Professor R. E. Peierls, of Birmingham University; Professor P. M. S. Blackett, of Manchester University; Dr. J. Rotblat and Dr. T. G. Pickavance, of Liverpool University; Dr. N. Kurti, of Oxford University; and Dr. H. W. B. Skinner and Mr. W. G. Marley, of Harwell. The chairman afterwards announced that the following had been co-opted to the Council: Dr. S. Devons and Dr. N. Kemmer, of Cambridge University; Dr. K. F. Chackett, of Durham University and Dr. G. O. Jones, of Oxford University.

The meeting passed a resolution, viewing with great satisfaction the report of the proposals put forward by Mr. Bernard Baruch for the international control of atomic energy, and expressing the hope that the proposals would soon be implemented. Arrangements were discussed for an international conference at Oxford from July 29-31.

As the second of several projected steps in the development of Polymer Corporation, Sarnia, Ont., as the hub of a new chemical industry in Canada, an agreement has been reached with Monsanto (Canada), Ltd., of Montreal, for the purchase by that company of a minimum of 6,000,000 pounds a year of styrene monomer. The first such agreement was completed last year, with Dow Chemical of Canada, Ltd.

Natural Products of the Empire—I

Their Utilisation as a Basis for Chemical Industries

ONE of the earliest subjects to be discussed in the Empire Scientific Conference which is now in session, was that indicated in the title of this article, the importance of which to the chemical industry is implicit. The general subject was introduced by Dr. J. L. Simonsen, F.R.S., Director of Research of the Colonial Products Research Council; and papers on special aspects of it were presented by Dr. E. J. Hartung, Professor of Chemistry in the University of Melbourne, for Australia; by Dr. James Melvile, Director of the Plant Chemistry Laboratory, Palmerston North, for New Zealand; and by Dr. H. J. van Eck, M.I.Chem.E., for South Africa. A summary of their remarks is included herewith—as Dr. Simonsen said, the field covered by the title is so vast that it is possible to give only a brief survey within a reasonable space.

Dr. Simonsen's Paper

The natural products of the Empire may be divided into two classes—mineral (wasting) and agricultural and forest (growing) assets. The deciding factor in their utilisation is water, and an adequate survey of the water resources of the Empire is essential.

Rich mineral resources occur in the Empire, and the topographical and geological surveys now being organised may give valuable results. In the Dominions and India mineral ores are largely processed in the countries themselves, but in the Colonies processing is limited. Consideration might be given to this aspect, for instance in the case of the bauxite deposits of the Gold Coast and British Guiana. Attention should be given also to prospecting for low-grade ores to replace depleted stocks of high-grade material. The possibilities of the discovery of new sources of mineral oil and the development of chemical industries based on existing Empire oil fields should be kept in view.

Agriculture is the main industry of the Colonial Empire and upon its efficiency the prosperity of the Colonies depends. An efficient system requires a detailed knowledge of the soil based on adequate soil and soil-fertility surveys, study of ecology, plant and animal breeding, and the prevention of plant and animal disease. This must be accompanied by the maintenance of a correct balance between food and cash crops and the education of the cultivator.

Sucrose, apart from nutrition, finds comparatively little industrial use. The importance of intensive fundamental research is now fully recognised as is the need for improved varieties, cultivation, and extraction of the sugar-cane. Starch finds increasing application in industry, but little is known of the nature of starch from various sources. Recent research on the separation of the two constituents of starch—amylose and amylopectin— suggest the prospect of new technical uses. Although industrial alcohol is manufactured on a large scale in the Dominions and in India, little is made in the Colonies, and production could be encouraged by its use in motor fuel in the sugar-producing Colonies. Fermentation industries based on molasses and yielding industrial solvents and organic acids may also be of importance. Further uses must be found for molasses as, for example, in the manufacture of food yeast for human and animal nutrition, industrial enzymes, and antibiotics.

It has been the practice in the past to export oil seeds from the Colonies for extraction in more highly industrialised countries, but the treatment of the crops in the country of origin and the possibility of the local use of the residual cake should be investigated. Reafforestation of suitable areas with species of *Pinus* might provide valuable Empire sources of turpentine and rosin. The manufacture of vanillin from lignin and guaiacol endangers the Zanzibar industry in clove-stem oil, and it is urgently necessary therefore to find new uses for eugenol.

The development of minor forest products, such as lac and cashew-nut oil, gums and plants of potential insecticidal and medicinal value, should be undertaken. From growing and the utilisation of the by-products of the fruits should be encouraged. Except for hides, too little attention has been paid to the possibilities of industries based on livestock and fisheries.

Chemicals from Wool

Professor Hartung dealt briefly with the utilisation of some of the natural products of Australia, excluding minerals and coal, only products and wastes of major importance being included.

Wool production is the greatest single industry in Australia, and as by-products to the scouring of natural greasy wool, suint and wool-wax are obtainable. The former is the name given to a complex mixture of potassium and other soaps accumulated in the fleece from the perspiration of the sheep; the latter denotes the wool-grease consisting chemically of a complex mixture of cholesteryl and other esters which are essentially waxes rather than fats. The average annual Australian clip of greasy

wool contains about 80,000 tons of wool-wax and 30,000 tons of suint.

Suint is soluble in water, but wool-wax is insoluble, although it may be emulsified in water very readily. In the process of wool scouring with soapy or alkaline liquors, the wool-wax and suint pass into the wash waters and produce a very troublesome industrial effluent. In the past, efforts at recovery of the wool-wax have been directed mainly to improving the quality of the effluent so as to render it less objectionable for municipal disposal. Various processes of recovery have been tried and are in use, such as treatment with acid, centrifugal separation, forced aeration and flotation. By these means, 50 per cent. or more of the wool-wax may be recovered, but the valuable potassium salts are lost; treatment is not cheap owing to the large volumes of dilute effluent which must be handled.

Solvent Extraction

Solvent extraction of the wool itself has therefore been tried in Europe and America, though British practice has been conservative in this regard. Hydrocarbon or chlorinated hydrocarbon solvents are used before or after water extraction; by these means very good recovery of the wool-wax and potassium salts is obtained. Expensive plant is needed, but the process has much to commend it, although opinion is divided on the relative merits of scouring and solvent extraction.

Purified wool-wax is marketed in lanoline; it is a rich source of sterols and of higher alcohols and fatty acids generally. Suint is a source of potassium salts and fatty acids. From these wool-products many useful substances might be obtained either directly marketable or capable of serving as intermediates in organic chemical industry. A thorough investigation is being undertaken by the Industrial Chemistry Division of the C.S.I.R. of Australia. At present, of the 15,000 tons of wool-wax potentially available in wool scoured in Australia, only about 450 tons are saved, and the associated 5,000 tons of suint are wholly lost.

The possibility of utilising waste wool itself as a chemical raw material should also be mentioned. A promising field of investigation is open here, as for example in the production of protein hydrolysates of special type for medicinal use, for fertilisers, or for the manufacture of synthetic fibres and plastics.

The eucalyptus forests of Australia and Tasmania are capable of yielding large amounts of products. Great quantities of paper are produced in Australia and Tasmania into which eucalyptus pulp enters largely or wholly. Eucalyptus wood requires in general less alkali for pulping than softwoods because of the lower content and more reactive nature of the lignin in it. However, the pulp contains a larger amount of more resistant xylan than a softwood pulp, and for special purposes, such as the production of high-alpha-cellulose pulp for explosives and the viscose industry, the content of this xylan must be reduced by special refining processes. The technique for this has been worked out in Australia, and attachment to the use of long-fibred pulps should not hinder the development of short-fibred stock for these purposes.

From the spent liquors removed during the chemical pulping process in Victoria, some 10,000 tons of dry lignin could be obtained annually, and about half this quantity in Tasmania. The Victorian material contains combined sulphur and the Tasmanian does not, while neither represents the true lignin originally present in the wood. The reason is that chemical pulping is a crude process in which the lignin of the wood may suffer a preliminary polymerisation under the action of the alkali and then has to be degraded by further severe cooking into a soluble form which may be precipitated from the resulting " black liquor " by acid. During the cooking, the cellulose of the wood is partly degraded also, with consequent lowered yield of pulp, and the pulping process of the future aims at modification to minimise this disadvantage. The most promising methods seem to be hydrogenation of the wood in alkaline solution at high pressures, resulting in the production of alcohols and hydrocarbons from the lignin which can be used as fuel, and the process of preliminary acid hydrolysis of the wood followed by a mild alkaline cook.

Tests show that eucalypt lignin and thiolignin may in future supply large amounts of thermo-setting and thermo-plastic materials for plastics and laminated products, either by themselves as extenders, or in combination with phenols, amines or aldehydes. There is also the possibility of useful organic intermediates being made from it.

Types of Oil

Two general types of eucalyptus oil are obtained—the cineol type and the phellandrene type. Each consists of complex mixtures of terpenes and related compounds, and only the cineol type is suitable for medicinal use. The bulk of the oil produced in Australia is exported or used locally for mineral flotation. No production figures are available, but immense quantities are potentially available in Australia and Tasmania.

Of the vast quantity of straw potentially available from the annual Australian wheat crop, one use is in the production of a semi-chemical pulp for the manufacture of strawboard by cooking under pressure with lime. Some 10,000 tons of straw are used annually

for this purpose in Australia. Attempts have been made to combine this with furfural production, but the yield is insignificant for commercial purposes. On the other hand, acid hydrolysis of the straw may yield from 6 to 8 per cent. of furfural, but the resulting pulp is so degraded as to be useless. The recent claims of some German workers that both furfural and pulp may be obtained in good yield by mild acid hydrolysis followed by alkaline cooking have been tested in Australia; the yield of usable pulp was satisfactory, but that of furfural disappointing, although the method may be capable of development. Oat hulls, rice hulls, cotton-seed hulls, and maize cobs have also been shown to yield from 10 to 11 per cent. of furfural by acid hydrolysis, leaving a residue which might be used as a filler for plastics. Some 15,000 tons of these materials are available annually in Australia, but the local market for furfural could hardly absorb more than from 100 to 500 tons annually for use in plastic manufacture, where its special properties of increased flow in the mould, better bonding, and higher heat-resistance than the phenol-formaldehyde resins, have an advantage.

Sugar as a Chemical Raw Material

The feasibility of using Australian sugar directly as a chemical material has been studied in order to meet a predicted world over-production in the near future, and for obvious reasons the possibility of using the expressed cane juice instead of manufactured sugar commends itself. No published work on this matter has appeared in Australia, but American workers have been active for the last fifteen years, although no commercial process seems yet to be in operation on a large scale.

The general directions of this work have been the production of alkyl esters of laevulinic acid for use as solvents for gums and resins, of octa-esters from sugar as a polyhydric alcohol for adhesives, cooking with lime under pressure to make lactic acid, electrolysis of sugar solutions, the production of allyl sugar for use as a varnish, and hydrogenation of sugar, or of the sugar-cane itself, after treatment with alkali under pressure, to give chiefly hydrocarbon oils. The main use of sugar as raw material is, however, in the fermentation industries, where it is first hydrolysed to hexoses and these are then fermented by a variety of organisms.

Of the 125,000 tons of molasses produced annually in Australia about 50 per cent. is sold to distillers for power alcohol and rum production, about 21 per cent. is used as stock food, about 14 per cent. as fertiliser, 13 per cent. is burnt at the mills as fuel, and a small portion runs to waste. Butylene glycol has been produced in Australia from wheat, and molasses may be used as the starting-point here. There does not, however, appear to be much scope for the expanding use of Australian molasses in these directions, except in the diversion of that which is now used as fuel.

Australian Fisheries and Seaweeds

Australian coastal and pelagic fisheries are not well developed, and no chemical industries of importance are based on their by-products. However, processing of offal for manures and fodder has been established in some places, and the production of liver-oil rich in vitamin A from the snapper shark reached 15,000 gallons annually towards the close of the war. It seems clear that development and exploitation must proceed on lines rather different from those which have been successful in European waters.

Investigations made during the war showed that a number of coastal seaweeds could be used for agar manufacture, and in particular *Gracilaria confervoides* from New South Wales waters might furnish a 30 per cent. yield on the dried-weed basis. The present yearly output of agar in Australia is about 24 tons, but information suggests that at least 100 tons of agar can be produced annually from known sources.

There is also the possibility of establishing the manufacture of alginates, for large beds of *Macrocystis* occur in Tasmanian waters and are relatively easily harvested in comparison with others used in the U.K. during the war. No information is available with regard to the quantities available, but the interesting properties of the alginates and their varied uses make this a prospective industry with attractive features.

(To be continued)

CHEMICAL WORKERS' UNION

The 18th biennial general meeting of the Chemical Workers' Union is due to open at the Co-operative Hall, Downing Street, Manchester, this (Saturday) afternoon, with a civic reception by the Mayor of Manchester. The meeting will be continued on Sunday.

Among several resolutions to be brought forward are some of general interest. One calls upon the Government to set up a Select Commission to inquire into and report upon the nature and ramifications of all existing international cartels, involving trusts, combines, or individual firms in the British chemical industry. Another urges that the chemical industry should be nationalised " in the interests of the future peace of the world." Two others plead, respectively, for the formation of a national wages board for the chemical industry, and for an extensive increase in the Government factory inspection staff.

The World Shortage of Fertilisers

U.S. Survey of Present Position and Prospects

A SURVEY recently undertaken by the United States Department of Commerce has led to the conclusion that the present world-wide shortage of fertilisers will continue during the next fertiliser "year," which begins on July 1. Reports from Finland, Italy and Japan all stress the seriousness of the situation in those countries.

The functions of the Fertiliser Committee of the Combined Food Board are to be continued either under the auspices of the Board or its proposed successor, the International Emergency Food Council. Consideration is to be given, the Department's report states, to the desire of producing countries that allocations of fertilisers be made to permanent rather than temporary markets, where feasible. It is predicted that the supply of major fertiliser materials available to U.S. farmers in the twelve-month period beginning on July 1 will be about the same as during the current fertiliser year and demands will continue heavy as farmers seek maximum production for overseas food relief shipments.

Plant Expansion Hindered

Many U.S. fertiliser companies are hoping to expand facilities, but this may not be possible because of limitations on the use, and serious shortages of, various types of construction materials, which have hindered construction activities of U.S. fertiliser manufacturers since the beginning of the war. According to the National Fertiliser Association—a trade association—various U.S. fertiliser manufacturers are planning new capacities ranging from 10 to 65 per cent. of their present facilities, but the building construction programmes are expected to extend over a period of from one to three years. Manufacturers' fertiliser reserves in the U.S. were greatly depleted in April, as the material was rapidly moved out to supply the heavy seasonal demand. Several shortages of mixed fertilisers have been reported in various localities in the U.S.

Agricultural requirements for U.S. nitrogen during the coming fertiliser year are estimated at 800,000 tons by the Department of Agriculture, but estimated supplies are about 100,000 tons short of this figure. The current year's supply, originally estimated at 700,000 tons of nitrogen, has been reduced to 689,000 tons. Deliveries up to April 1 are reported to have amounted to 572,000 tons. Reports from Chile indicate that a production goal of 2,000,000 metric tons of sodium nitrate has been set for 1946-47. Probable output during 1945-46 will be 1,600,000 metric tons, or 43 per cent. more than during 1944-45. There were 22 nitrate plants in operation in Chile in December, 1945, as against 14 in 1944.

Production of phosphate rock in the western states of the U.S. fell 8 per cent. below the 1944 record 274,198-ton output, according to the U.S. Bureau of Mines' annual report. Figures on 1945 production in Florida and Tennessee, the leading producing states, are not yet available. Agricultural requirements for U.S. potash during 1946-47 have been placed at 800,000 tons and chemical needs will require 164,000 tons, according to the Department of Commerce report. Output is expected to be little, if any, higher than this year. The potash producers have recommended that potash be placed under allocation control in order to direct the limited supply into consuming channels.

Confirmation of the probable continuance of the world shortage in fertiliser supplies appears in the appraisal of the world food situation for 1946-47 which the Food and Agriculture Organisation of the United Nations prepared for the FAO's special meeting on urgent food problems held in Washington in May, 1946. The appraisal states that preliminary estimates of the amounts of chemical fertilisers which may be available for crops to be harvested in 1947 indicate there may be fairly substantial increases for all three plant nutrients—nitrogen, soluble phosphates and potash—as compared with the amounts applied to crops to be harvested in 1946; but there will still be a deficiency of some 30 per cent. in supplies of nitrogen and soluble phosphates and some 5 per cent. in the supplies of potash, judging from requests of countries received by the Combined Food Board. "In general," the appraisal states, "the fertiliser picture indicates that supplies will be short in every major producing area in the world . . . ."

Estimates

Chemical fertiliser allocations of the Combined Food Board for 1945-46, and estimates for 1946-47, together with the pre-war data, are summarised in the appraisal report in the following table (the figures given are in million metric tons):

	Pre-war production	Allocations 1945-46	Estimates 1946-47 Production	Estimates 1946-47 Demand
Nitrogen (N)	2.2	1.6	2.4	3.3
Phosphoric acid (P_2O_5)	3.1	3.1	4.1	5.5
Potash (K_2O)	2.4	2.1	3.2	3.3

Report of Snia Viscosa

The Company's Worst Year

THE Società Snia Viscosa, of Milan, before the war the largest producer of synthetic fibres in the world, experienced in 1945 its worst year since the formation of the company. Conditions in the last phase of the war and the first months of peace severely affected the activities of the concern. The collapse of the German occupation gave rise to grave problems for the administration to solve in connection with the restoration of production. On the proposal of the Economic Commission of the Liberation Committee, the Allied military authorities appointed a commissioner to take over administration of the concern, and he has now handed over control to a new board appointed by a shareholders' meeting.

In his report, the commissioner, Mr. L. Baldini, states that production capacity of the firm's industrial plants is almost intact, and that it would be possible to utilise it to full capacity immediately. Since the company has for some years been cut off from its normal suppliers of raw materials, however, the immediate task must be to replenish the sadly reduced stocks of raw materials. Certain supplies of cellulose and other materials have already been secured by barter with Norway and Sweden. The resumption of production has met with great obstacles from insufficient coal supplies, so far only about one-quarter of normal needs, so that it has not been possible to satisfy heavy foreign demands for synthetic fibres.

Expansion of Industry

The report then refers to the world-wide tendency of the synthetic fibre industry to expand, despite the competition of natural fibres. The Italian industry, which had already gained a leading position in world production, both as regards output and export trade, was trying to reconquer this position. It expected neither assistance nor protection, but wished merely to expand freely and intensify its exports. Even if export trade stood in the forefront, the company had in no way neglected the demands of the home market. Thus, immediately after the liberation of Northern Italy, considerable quantities of synthetic fibre products had been placed at the disposal of the poorly-supplied sections of the community at fixed prices.

The rapid rise in production costs and the simultaneous freezing of prices destroyed the equilibrium between production costs and receipts from sales, and unfavourably affected the financial position. Nevertheless, even after the relaxation of the sharp price control, the company had continued to sell their output at a reasonable price. In an effort to create a solid basis for future developments and to meet the needs of consumers, the company would continue its policy of low prices and pay special attention to the improvements in production. The progressive reduction of stocks of finished goods, the necessity to expand stocks of raw materials, the obligation to retain the services of unproductive and superfluous skilled workers, and other circumstances, compelled the company to effect the financing of productive activity on new principles. Bank credits had had to be obtained, but these had already been repaid. The financial position of the undertaking showed a balanced and sound development, which could be rapidly consolidated as soon as prices were adapted to the increased production and operating costs. Future prospects were therefore favourable.

The Balance Sheet

In the balance sheet (figures in million lire), the value of factories, agricultural properties, plant and machinery, the buildings is entered at 1,045, an increase of 10.2. Shares and interests in foreign undertakings have dropped by 5 to 588.4, while obligations for reconstruction credits increased by 86.9 to 200.3. Realisable assets have risen from 273.9 to 518, consisting of stocks of raw materials and finished products valued at 362.1 (156.3) and creditors to the amount of 155.8. On the liabilities side, capital remains unchanged at 1,008, but reserves have dropped to 321 from 368.3. Depreciation funds have risen to 741.3, and debtors amount to 337.8 (270.3).

Gross profits in 1945 increased to 269.4 (251.4), while taxation dropped to 62.2 (86.6). Owing mainly to the rise in wages and salaries, general charges were practically doubled at 124.3 (61), and net profits consequently fell to 18.8, against 45.3 in 1944. An unchanged gross dividend of 6.66 per cent. is being paid.

The annual general meeting elected a new board, including the retiring commissioner, Mr. Baldini, and four representatives of foreign interests. After consultation with the workers, Mr. Franco Marinotti, for many years president of the concern, was re-elected to his former position.

Austrian salt production, concentrated in the American zone of occupation, amounted to 7000 tons in March, compared with 4950 and 5230 tons in the two preceding months. Salt is, in the main, being bartered against goods from Czechoslovakia.

A CHEMIST'S BOOKSHELF

SUNFLOWER : FOR FOOD, FODDER AND FERTILITY. By E. F. Hurt. London : Faber & Faber. Pp. 155. 10s. 6d.

During the present period of shortage of oils and fats in the United Kingdom the question has arisen in the minds of some people regarding the steps that have been taken, or are contemplated, with a view to increasing these supplies by means of the cultivation of oilseeds in this country. It is known that serious attempts have been made in the past to grow soya beans in parts of England, but the results were not as promising as were hoped for. Other oilseeds have also been, or are being, tested.

Among those oilseeds with which experiments have been carried out during recent years is the sunflower. Although sunflowers have been grown for endless years in very many gardens throughout England, it was not until 1940 that serious experimental work was started. Two years later the scope of the trials was widened as a result of financial assistance from the Ministry of Agriculture and the Agricultural Research Council. In 1944 as many as 250 acres were laid out on a farm scale in plots of from 2 to 30 acres and over a wide area of England. These experiments have indicated suitable varieties of sunflower to grow in this country, and show that an average yield of one ton of seed per acre can be reasonably expected. Experience has revealed the necessity of centralising this cultivation into acres, in each of which there would be available a suitable thresher and a drying plant. Drying has to be carried out within 24 hours, if possible, of threshing, as sunflower seed, containing from 13 to 15 per cent. of moisture, will heat within that period.

The author of this book has been engaged on growing this crop for several years in England and during this period he has been associated with Mr. G. E. Blackman, who has been experimenting with oilseed crops in this country. The theme of the book is essentially the production of sunflower seed in England, but sufficient background to this subject is provided in the first part of the volume, where chapters are included on the importance of edible oils and on the history, nature, and utilisation of the sunflower.

Part 2 forms the greater proportion of the book. Here is discussed at considerable length the sunflower with special reference to England. After summarising what has so far been accomplished with this crop in this country, the author deals with the all-important question of the choice of seed and site and with pre-cultivation. Very many varieties have been tried out, but only a few, mostly semi-drawf, can be recommended. The most suitable portion of England for this crop lies south of a line drawn from the Wash to the mouth of the Severn. Details are given of sowing and of the most suitable types of drill to use for this purpose, together with hints as to after-cultivation.

Sunflowers, like other crops, are subject to pests and disease. Wireworms are very liable to cause trouble, particularly in the early stages. Birds also cause damage, partridges and pheasants eating the young shoots and greenfinches the seeds from the heads. Two diseases of a fungous nature attack the plant, sclerotina affecting the stem and botrytis the heads. The harvesting of the sunflower is dealt with in a succeeding chapter. For this purpose combine harvesters have proved successful, except where the moisture content of the standing crop is not sufficiently low. The alternative method in vogue is hand cutting, followed by stooking or fencing. The seed, after threshing, should be dried, and methods and plant for this purpose are described.

The volume concludes with a brief résume of sunflower cultivation abroad and chapters on the analyses of various parts of the sunflower plant; selection and breeding; and vernalisation. The book is well-illustrated with 20 plates and 9 diagrams and is furnished with an index. Six appendices are added, dealing, *inter alia*, with notes on centralisation, and a bibliography.

The author is to be congratulated upon his thorough treatment of the subject. The information is presented in a very readable and interesting form. He gives a full account of what has already been effected in England and indicates that much more could be done if only farmers were encouraged to go in for this crop on a much more extensive scale. Those who are concerned with the production of edible oils in this country can be recommended to study this book.

A TEXT BOOK OF FORENSIC PHARMACY. By Thomas Dewar. London : Edward Arnold. Pp. 253. 10s. 6d.

Recently in these columns we reviewed Lucas's *Forensic Chemistry*, and this book comes as a suitable supplement to it, to remind us that forensic work has its civil as well as its criminal aspects. The regulations concerning the sale, supply, and storage of poisons and dangerous drugs are many and complex. A working knowledge of them must be acquired by those studying for the qualifying examinations of the Pharmaceutical Society; and this book is primarily designed as a suitable text book. It opens with an account of the functions of the Society itself, undoubtedly useful to intending members. Otherwise the book justifies its title in straightforward fashion. It is a drawback to its use as a general reference book that the index would prove of very little service to anyone not thoroughly familiar with the lay-out of the book and the

precise category containing the point or substance on which information was sought. On the other hand, this may be an inducement for students to get to know the book familiarly. Useful appendices contain the schedules and regulations dealt with through the book, and tables of the abbreviations and terms to be met with in this sphere are included.

METHODS OF ANALYSIS OF THE ASSOCIATION OF OFFICIAL AGRICULTURAL CHEMISTS (6th Ed.). Washington, D.C. Association of Official Agricultural Chemists. Pp. 932.

Analytical chemists are thoroughly familiar with the elaborate reference work of which this is the sixth quinquennial revision, containing methods adopted up to October, 1944. As might be expected, considerable revision has been carried out. An innovation is the use of section cross-references, which, it is claimed, will make the book more convenient for use by the worker at the bench. In the reviewer's experience, in the case of other books in which this system is adopted, this is not so. Page numbers are still by far the most convenient method of cross-reference, and the sole advantage of the other method appears to lie in ease of proof-reading. The binding of the book is far from substantial enough for such a massive volume, otherwise well-produced, which is expected to undergo five years' intensive use "by the worker at the bench." Indeed, the copy under consideration is already showing signs of dividing at the junctions between the various signatures. However, the amount of concentrated information contained in the book will undoubtedly make it a much-thumbed reference work.

The only curious point to which attention might be drawn is that in almost a thousand pages of standard methods, only four pages are devoted to microchemical procedures. This seems an unduly small number of applications of micro methods to an extremely wide range of materials.

DISINFECTANT POWDERS

A British Standard Specification for disinfectant and sanitary powders has just been issued by the British Standards Institution. It classifies disinfectant powders into: (a) carbolic powders on which tests for germicidal efficiency and phenols content are specified; (b) hypochlorite powders, on which a test for available chlorine is given; and (c) other powders, the effectiveness of which is ensured by specifying a minimum germicidal efficiency on the basis of a Rideal-Walker coefficient. Copies of the specification (B.S. No. 1013) can be obtained from the B.S.I., 28 Victoria Street, London, S.W.1. (2s. each).

Chemical Exports

Increase in Figures for May

THE Board of Trade monthly accounts for May, issued this week, show that for the first time since the war the volume of exports from the U.K. is estimated to have exceeded the monthly average for 1938. The chemical industry has played no small part in bringing about this welcome improvement.

Actual exports in May were about 15 per cent. greater in volume than the 1938 average, but account must be taken of the fact that May had 27 working days, compared with rather under 26 working days for the average month throughout the year. In terms of exports a working day, the volume of exports was about 11 per cent. better than the 1938 average. The total value for the month was £115,870,481, which is the highest for any month since the end of the war.

Commenting on the figures, Mr. H. A. Marquand, Secretary for Overseas Trade, said the May improvement was not likely to be repeated fully in June, which, because of the inclusion of V Day and Whit Monday, would have only 23 working days, but might possibly be repeated in July. In view of the continuous increase in the total man-power engaged on manufacture for export—the total at the end of April was already one-quarter higher than in 1938—the increase in the volume of exports was bound to continue. The original target of £750,000,000 worth of exports for the year 1946 would now clearly be exceeded.

Exports of chemicals, drugs, dyes and colours during May were valued at £6,256,915, which is £1,243,723 higher than the April figure; £3,567,281 higher than the figure for May, 1945; and £4,400,266 higher than the monthly average for 1938. British India was again the biggest customer, her purchases totalling £784,516. Italy was second with £370,616, and the Union of South Africa third with £324,400.

There was also an increase in imports of chemicals, drugs, dyes and colours. The total value was £1,828,490, which is £1,576,996 higher than the figure for April; £25,203 higher than the figure for May, 1945; but £305,901 less than the monthly average for 1938. The U.S. was again the largest supplier, with £400,046; Chile was second with £339,605 and Spain third with £336,826.

The Control of Containers and Packaging (No. 4) (General) Order, 1945, and the British Standards Schedules referred to therein, prescribe standard sizes of new and second-hand metal containers (other than collapsible tubes), and of new glass bottles, which must be used for the packaging of goods for sale in the United Kingdom.

Personal Notes

LORD RUSHCLIFFE has been appointed deputy-chairman of Borax Consolidated, Ltd., in succession to Col. J. W. Reid, who has relinquished that post after 40 years, but retains his seat on the board.

DR. GWYN WILLIAMS, who has been appointed to the University Chair of Chemistry at Royal Holloway College as from October 1 next, has been Lecturer in Chemistry at King's College, London, since 1939.

MR. IVOR COOPER, of Lever Bros. & Unilever, Ltd., who completes his year of office as chairman of the council of the British Export Trade Research Organisation this month, is to be succeeded in that capacity by MR. LESLIE GAMAGE.

MR. J. V. CROSSLEY has been elected chairman of the Scottish section of the Oil and Colour Chemists' Association. MR. J. INCH is vice-chairman. MR. T. C. CORBETT has been elected hon. secretary, and MR. H. NEWTON remains as hon. treasurer.

MR. J. G. C. CAMPBELL, B.Sc., of the Wellcome Physiological Research Laboratory, Beckenham, is taking up an appointment on July 1 with Enthoven Chemicals, Ltd., as works manager and chemical engineer at their recently-opened Darley Dale works, Derbyshire.

SIR LAWRENCE BRAGG, F.R.S., who is Professor of Physics at the Cavendish Laboratory, Cambridge University, was presented with the E. J. Fox gold medal for outstanding contributions to fundamental theoretical metallurgy, at the annual conference of the Institute of British Foundrymen, held at Birmingham last week.

MR. DUDLEY CHRISTOPHERSON, who has been sales director of Albright & Wilson, Ltd., for the past 14 years, is retiring after being associated with the chemical industry since 1897, when he joined his father's firm, Clifford Christopherson & Co., which in 1932 became an associated company of Albright & Wilson, Ltd.

More Birthday Honours

The second part of the King's Birthday Honours, the principal section of which appeared last week, was published on Monday.

Among recipients of the O.B.E. are the following: MR. A. W. BOWNE, technical director, Chloride Electrical Storage Co., Ltd., Manchester; MR. C. M. CAWLEY and MR. D. MACDOUGALL, principal scientific officers, Fuel Research Station, D.S.I.R.; SURG.-CAPT. A. FAIRLEY, R.N. (retd.), principal scientific officer, Chemical Defence Experimental Station, Ministry of Supply; MR. G. V. B. HERFORD, officer in charge, Pest Infestation Laboratory, D.S.I.R.; and MR. W. H. J. VERNON, principal scientific officer, Chemical Research Laboratory, D.S.I.R.

Among those appointed M.B.E. are the following: MR. W. A. S. BUTEMENT, assistant director of scientific research, Ministry of Supply; MR. GEOFFREY GRIME, principal scientific officer, D.S.I.R.; MR. DONALD ECCLESHALL, principal technical officer, Chemical Research Department, Ministry of Supply; LIEUT.-COMMANDER E. E. HARRIS, R.N. (retd.) assistant Chemical Defence Experimental Station, Ministry of Supply; MISS L. M. SUTTON, chief chemist, George Bray & Co., Ltd., Leeds; MR. C. W. TRICKETT, works manager, I.C.I. Metals, Ltd., Swansea, and MR. S. H. D. WARD, chief chemist, Ericsson Telephones, Ltd.

The British Empire Medal goes to MR. W. A. FANCOURT, leading aluminium caster, Non-Ferrous Die Casting Co., Ltd., London; MISS MILLICENT GREEN, chargehand (light alloy sheet and strip production), I.C.I., Ltd., Birmingham; MR. W. A. HOGGER, scientific instrument maker, E. R. Watts & Son, Ltd., London; MR. T. J. PEARSON, foreman, I.C.I., Ltd., Billingham; MR. F. TALBOT, foreman, I.C.I., Ltd., Runcorn; and MR. B. WOOLCOTT, assistant, Chemical Defence Experimental Station, Ministry of Supply, Porton.

Gas Company Changes

The retirement of MR. J. H. OLLIVER at the end of last year and of MR. W. G. ADAM, as just announced, has resulted in several changes in the by-products side of the Gas Light & Coke Company. The complete organisation, covering coke and all other by-products, is now under the direct control of MR. W. K. HUTCHISON, who was appointed controller of by-products at the end of last year. MR. S. ROBERTS succeeded MR. Olliver as products salesman, and MR. L. W. BLUNDELL has now been appointed superintendent of the products works in succession to Mr. Adam. Two other appointments have been made at the products works: MR. D. G. MURDOCH as products manager and MR. C. C. SMITH as works manager. Both Mr. Olliver and Mr. Adam are retained as consultants, and their wide experience of the by-products side of the gas industry will be available to the company.

REFINED OIL PRICES

With reference to the oil prices given on p. 742, it should be noted that up to the time of going to press we were unable to obtain from the Ministry of Food any statement regarding the prices of refined oils for the period which began on June 22.

It is understood that the new Minister of Food gave instructions that he must see all Press messages before they are issued, and at present he is in America.

Parliamentary Topics

Austrian Oil Resources

IN the House of Commons last week, Lt.-Col. Sharp asked the Chancellor of the Duchy of Lancashire to what extent the mineral oil resources of Niederdonau in Austria in the Russian zone of occupation were being made available to the British zone of occupation.

Mr. J. Hynd replied that the oil requirements of the Austrian civilian economy were not assessed in terms of zones of occupation but were determined for Austria as a whole by the Austrian Government in conjunction with UNRRA. The output of the Niederdonau fields was made available to meet those requirements with the exception of certain quantities of motor spirit and fuel oil which are used locally by the Russian authorities or earmarked for export under bilateral trade agreements.

Lactose

Mr. S. Marshall asked the Minister of Food the total lactose production in this country at present; and whether he was satisfied it is ample to meet all requirements.

Mr. Strachey: "The total production of lactose in the three months ended March 31, 1946, was approximately 700 tons. The quantity produced is dependent on supplies of whey, but at the present rate of output all essential requirements can be met."

Oil Seed Crops

Major J. Morrison asked the Minister of Agriculture what attention his Department was giving to the possibility of producing vegetable oils and fats in this country.

Mr. T. Williams: "The hon. member presumably has in mind the growing of oil seed crops for food and feedingstuffs. The production of such crops, and particularly linseed and sunflowers, in this country, has been closely investigated, and advice is available in published form for the guidance of farmers."

Potash

Sir D. White asked the Minister of Agriculture, in view of the importance of potash for agricultural production and the fact that supplies before the war were largely obtained from France and Germany, if he would say what was being done to ensure the provision of a plentiful supply for 1947 crops.

Mr. T. Williams: "Supplies of potash for the 1946-47 season will be obtained from Spain, France, Palestine, Germany, and Chile, and I hope that it will be possible to secure a substantial increase in the quantity of this fertiliser as compared with 1945-46." He added that every possible effort was being made to ensure that all agricultural demands for potash in the U.K. would be met.

Granulated Fertilisers

Replying to a question by Sir D. White, the Minister of Agriculture said he was advised that fertiliser manufacturers were fully aware of the growing demand for fertilisers in granular form and were arranging for a substantial increase in output in the coming fertiliser season.

General News——From Week to Week

The rapid ending of petrol rationing is urged by the National Union of Manufacturers in a communication sent to the Minister of Fuel and Power this week.

The Irish Development Company has been formed to exploit a process discovered by Dr. Oscar Brunler for the rapid seasoning of green timber by the self-impregnation of the wood by its own resin.

The address of Mr. Norman Sheldon, of the Worcester Royal Porcelain Co., Ltd., and John Moncrieff, Ltd., is now 30 Curzon Street, London, W.1. (tele.: GROsvenor 3004).

As a prize in the golf competition which is to be held under the auspices of the Paint Industries Club at Moor Park, near Rickmansworth, Herts., on Tuesday next, a silver tankard has been offered by Mr. Gordon Ferguson, of the Cornbrook Chemical Co., Ltd.

Fredk. Boehm, Ltd., of Beaconsfield, report their return to London on June 26. Their address is now 19 Bentinck Street, W.1 (telephone, WELbeck 7933; telegrams, Bissula, Wesdo, London).

The first of a series of industrial demonstrations for disseminating information to works managers and welfare officers on the most successful ways of combating industrial dermatitis was held recently at Manchester. It was pointed out that workpeople should be provided with a good barrier cream and instructed in its use.

Following the retirement of Mr. R. Henderson, who had managed the Glasgow office of Peter Brotherhood, Ltd., engineers, Peterborough, for many years, the company has appointed Henderson Agencies (1945), Ltd., 26 Bothwell Street, Glasgow, C.2, to be its agents for the whole of Scotland and Northern Ireland.

Banking facilities are now available for payments between Siam and the U.K., according to the *Board of Trade Journal*. Advice has also been received that any import licence granted by the Import Licensing Board in Siam is *ipso facto* a guarantee that foreign exchange will be made available to pay for the goods covered thereby.

The Board of Trade announces that as from July 1 no further purchases of pine tar will be made on Government account. Thereafter imports will be entirely on private account. Such imports, save in exceptional cases, will be through the Wood Tar and Pitch Importers Association, Ltd., acting on behalf of its members.

A new educational film dealing with furnace practice has been prepared for the Ministry of Fuel and Power, and copies, in both 35 mm. and 16 mm., are available on loan from the Central Film Library and on application to Regional Fuel Officers of the Ministry. It is accompanied by a running commentary.

In a survey of requirements for the future training of technicians in the chemical industries in Scotland, issued by the Special Committee of the Advisory Council on Education in Scotland, it is urged that better training facilities be made available for routine workers engaged in scientific manufacture and testing and for whom a certain amount of knowledge is required.

Delegates to the Imperial Press Conference paid a visit on Monday to the I.C.I. works at Billingham where they saw various chemical processes. The delegates, who were headed by Colonel J. J. Astor, the chairman, were received by Mr. A. T. S. Zealley, chairman of the Billingham division of I.C.I., and later were entertained at luncheon.

The Ministry of Supply announces that the Control of Non-Ferrous Metals (Nos. 6 and 18) (Cadmium) Orders, 1941-45, have been revoked by the Control of Non-Ferrous Metals (No. 23) (Cadmium) (Revocation) Order, 1946, which came into force on June 24. The 1946 Order revokes the only Orders made by the Ministry of Supply under the title "Control of Non-Ferrous Metals (Cadmium)," which regulated the acquisition, disposal and price of cadmium.

The production of seed oil on British farms was noted by Mr. Gilbert McAllister, M.P. for Rutherglen, when he told farmers at an N.F.U. meeting that this would become an expanding industry in Britain. It had been demonstrated as essential that Britain should grow her own industrial and edible oils and he foreshadowed that experiments now being conducted on many British farms would lead to large scale developments in the production of oil seed crops.

Beet is to be used by the Irish Alcohol Co. as a secondary source of supply for the extraction of alcohol, the company having hitherto had recourse to potatoes. Production from both beet and potatoes will be carried on simultaneously, farmers having agreed to grow beet for the alcohol plants on the same terms as for sugar.

Foreign News

The Soviet authorities are stated to have offered to send Russian technicians to Argentina to assist in the development of the native chemical industry.

The 1946 iron and steel exhibition sponsored by the U.S. Association of Iron and Steel Engineers, will be held in Cleveland from October 1 to 4, inclusive.

Czechoslovak mining authorities are carrying out investigations near Horné Strahary, in Slovakia, where occurrences of several important industrial minerals have been ascertained.

A non-profit making organisation, the Groupement Belge de Soja, has been formed at Uccle for the development of the production and utilisation of soya beans and products of these in Belgium and the Belgian Congo.

Installation of machinery and equipment at the plastic fabricating plant of Canadian Resins and Chemicals, Ltd., now under construction at Shawinigan Falls, Quebec, is proceeding normally and production is expected to begin this month.

The first annual meeting of the newly-formed U.S.A. Chemical Warfare Association was held recently at Edgewood Arsenal, Maryland. The proceedings included a highly effective field demonstration of chemical munitions and weapons.

Drilling for oil has been resumed in Sweden after an interruption due to labour troubles. According to the *Petroleum Press Service*, American and Swedish capital is involved in the operations, but no positive indications of the existence of commercial quantities of oil have as yet been obtained.

Canada's steel output for the first four months of this year amounted to 942,977 tons, compared with 1,010,944 tons in the same period of last year. Demand for steel continued far in excess of supplies, although the current output is almost twice as high as the pre-war production.

The Economic Development Committee set up by Sir Gordon Letham, Governor of British Guiana, has now put forward proposals for the opening up of the hinterland of the colony, including the creation of an aluminium industry utilising local bauxite, and the creation of a cellulose and paper pulp industry utilising a local variety of timber, the wallaba.

A Czechoslovak-Finnish trade agreement provides for the export of Finnish copper, cobalt, molybdenum, resins and cellulose, while Czechosolvakia will ship machinery, chemical products, fireclay and hard woods.

A Swedish commercial delegation has recently visited Berlin at the invitation of the Russian authorities to discuss the resumption of German-Swedish trade relations. It is proposed that Sweden should send Germany raw materials and electrical equipment in exchange for potash, cooking salt, Glauber salts, etc.

Forthcoming Event

July 8. British Association for the Advancement of Science (in collaboration with the Royal Society). Lecture Hall, Royal Institution, Albemarle Street, London, W.1, 2.30 p.m. Conference on "Dissemination of Scientific Information to the Public."

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

ANSOL CHEMICAL CO., LTD., London, E.C. (M., 29/6/46.) May 27, £4702 debenture, to S. I. Lyons, Southport; general charge.

Company News

An issue of 250,000 5½ per cent. cumulative preference £1 shares of the **London Aluminium Co., Ltd.**, at 21s. 6d. per share, was heavily over-subscribed shortly after the lists were opened on Monday.

Van den Berghs & Jurgens, Ltd., report net profit of £999,576 for 1945, as compared with £876,218 for 1944. The ordinary dividend of 10 per cent. is the same as for the previous year.

Net profit of £151,773 for the year ended March 31, as against £107,047 for the previous year, is reported by **Griffiths Hughes Proprietaries, Ltd.** Ordinary dividend, at 10 per cent., is 5 per cent. higher than the previous year.

Net profits of the **British Thermostat Co., Ltd.**, for the year ended January 31, were £19,782 (£22,611). Final ordinary dividend of 11 per cent. makes 18½ per cent. for the year, which is the same as for the previous year.

Accounts issued by **W. J. Bush & Co., Ltd.**, for 1945 show net profit of £138,883, as against £129,583 for the previous year. An 8 per cent. final ordinary dividend makes a total of 12 per cent., which is an increase of 2 per cent.

The Fullers' Earth Union earned net profit of £22,706 for the year ended March 31, as compared with £22,793 for the previous twelve months. The final ordinary dividend of 13½ per cent. includes bonus of 2½ per cent., making 17½ per cent. for the year, an increase of 2½ per cent.

The Chloride Electrical Storage Co., Ltd., report profits for the year ended March 31 totalling £486,928, against £526,033 for the previous twelve months. Final ordinary dividend is 5 per cent., plus bonus of 10 per cent., of which 5 per cent. is a victory bonus, making 20 per cent. for the year, an increase of 5 per cent. compared with 1944-45.

Johnson, Matthey & Co., Ltd., report that net trading profit for the year ended March 31 was £312,957, compared with £557,520 for the previous year. The recommendations of the board comprise the writing down of goodwill by £25,000; transfer to the staff fund of £3,500; and payment of a final ordinary dividend of 3 per cent., plus a bonus of 6 per cent., making 12 per cent. for the year (same).

The consolidated trading profits of **The Distillers Co., Ltd.**, and its subsidiary companies for the year ended May 15, after making provision for excess profits tax and overseas taxation, amount to £6,914,330. The corresponding figure for the previous year was £6,590,067. The profit of The Distillers Co., Ltd., is given as £2,558,240 (£2,157,663). The directors recommend payment of final ordinary dividend of 12½ per cent., which makes 20 per cent. for the year (which is the same as the previous year). The directors also recommend payment of a special ordinary dividend of 2½ per cent.

New Companies Registered

British Elastomers, Ltd. (412,855).—Private company. Capital £2,000 in £1 shares. Manufacturers of and dealers in rubber goods, plastics, chemicals, etc. Directors: W. A. Speedy, A. S. Mills. Registered office: Kenway, Southend-on-Sea.

Ross Products, Ltd. (413,134).—Private company. Capital £1000 in £1 shares. Manufacturers of and dealers in plastic, modelling and moulding materials and goods. Directors: C. H. Ross, Vera K. Ross. Registered office: 24 New Road, Brighton.

Southerden & Co., Ltd. (413,140).—Private company. Capital £100 in £1 shares. Manufacturers of and dealers in chemical substances and preparations of all kinds, etc. Directors: Miss I. Southerden, N. T. R. Beadell. Registered office: 26-7 D'Arblay Street, W.1.

Metal Chemical Finishes (Liphook), Ltd. (412,999).—Private company. Capital £1000 in £1 shares. Chemical and other metal finishers polishers, platers, etc. Directors: C. G. Boulton, F. P. King. Registered office: Longmoor Road, Liphook, Hants.

Sternol (Ireland), Ltd. (11,522).—Private company. Capital £100 in £1 shares. Manufacturers of and dealers in petroleum and petroleum products, and oils, greases, fats, etc. Subscribers: C. Warren, P. McMahon, 6 Shelbourne Terrace, Thomondgate, Limerick.

Quiz Reagents, Ltd. (412,782).—Private company. Capital £2000 in £1 shares. To acquire the business of manufacturers of and dealers in chemical and other products carried on at 54 Twickenham Road, Teddington, as "Quiz Reagents." Subscribers: G. Jupe, J. Hockman. Registered office: 26-27 Conduit Street, W.1.

Barber's Chemical Plant Co., Ltd. (412,795).—Private company. Capital £3000 in £1 shares. Manufacturers of and dealers in chemical and other plant and equipment, etc. Subscribers: C. Barber, 72 Park Road, Hampton Hill, Mdx., chemical engineer; W. W. Heath. Solicitors: Kenneth Brown, Baker, Baker, W.C.2.

Chemical and Allied Stocks and Shares

STOCK markets have been unsettled by international factors and the easier trend in British Funds, while the steady increase in the number of new issues has tended to divert buying interest from leading industrials. Nevertheless, compared with the big gains in most sections shown since the Budget, the reaction in prices has been moderate. Selling has not been particularly heavy, but buyers appear to be showing a cautious attitude, opinions differing as to whether the set-back will continue; much will probably depend on the trend of the gilt-edged market. Later, firmer conditions developed.

Reflecting the prevailing tendency, Imperial Chemical have moved back to 43s., Lever & Unilever to 55s. 6d., and Dunlop Rubber to 72s. Borax Consolidated eased to 49s. 6d., British Match to 50s. 3d., United Molasses to 54s. 4½d., and British Plaster Board to 37s. Associated Cement at 68s. 3d. reacted following their recent good rise, and despite the excellent impression created by the results and the raising of the distribution from 20 per cent. to 22½ per cent., the units of the Distillers Co. receded to 128s. 6d. xd. Greeff-Chemicals Holdings 5s. ordinary were around 12s., at which there is a yield of over 5 per cent. on the basis of last year's increased distribution of 12½ per cent. British Lead Mills 2s. shares were 13s. yielding 4⅜ per cent. on last year's 30 per cent. payment. Reflecting higher dividend hopes, British Glues & Chemicals 4s. ordinary were firm at 15s., with the 8 per cent. participating preference shares 44s. General Refractories went back to 23s., Goodlass Wall to 30s. 7½d., and Wall Paper Manufacturers deferred to 47s. 6d.

British Drug Houses failed to hold all their recent rise on the new share issue proposals, but were active around 71s. W. J. Bush continued firmly held and were around 85s. on the full results and higher dividend. Burt Boulton were 29s., and British Thermostat 25s. 6d., but elsewhere, British Industrial Plastics eased to 8s. 10½d., and De La Rue at £12½ lost part of the recent good rise, British Xylonite also moving back to £7⅛ on profit-taking. Erinoid were steady at 13s. 6d. Leeds Fireclay were 10s. and the preference shares 18s. Elsewhere, Fisons transferred around 62s. 6d. and Cooper McDougall & Robertson were 32s. 6d. In other directions, Monsanto Chemicals 5½ per cent. preference were 25s. Morgan Crucible 5½ per cent. preference have marked 29s. 3d.

Among iron and steels, Dorman Long moved lower at 23s. 3d., while United Steel were 22s. 3d., Stewarts & Lloyds 49s., and Tube Investments £6 5/32. Davy & United Engineering, however, attracted up to the higher level of 40s. 6d. Gas Light & Coke eased to 21s. 10½d., but Powell Duffryn have been more active around 23s. 3d. on higher dividend hopes. Babcock & Wilcox were moderately lower at 65s. 7½d. Textiles also reflected the reactionary trend of markets, Bradford Dyers being 25s. 4½d., Bleachers 13s. 9d., and Calico Printers 23s. 6d., Courtaulds also moving back to 56s. and British Celanese to 35s. 9d.

Boots Drug were good at 61s. Timothy Whites declined to 46s. and Griffiths Hughes to 60s. 3d., but Beechams deferred have been firm at 26s. 1½d. on the results and Sangers were 33s. 9d. Following their recent rise, Triplex Glass have come back to 45s. 6d. Amalgamated Metal at 20s. also lost part of their rise, and Imperial Smelting were 18s. 6d. British Aluminium were 43s. and British Oxygen 98s. 9d. In other directions, International Bitumen Emulsions shares have changed hands at 6s. 9d. Oils reflected the reaction in markets, Shell being 90s., Anglo-Iranian 98s. 9d., and Burmah 72s. 6d. Confirmation of the new issue report was followed by profit-taking in Ultramar Oil, the price falling back to 80s.

Prices of British Chemical Products

THE moderate inquiry on the London chemical market during the week covered a fairly wide range and the pressure for deliveries of supplies against contracts has been maintained. Apart from an increase in quotations for magnesium compounds, there have been no important price changes and the undertone of the market remains firm, with a definite tendency towards higher levels. The export demand continues to be substantial, actual bookings being limited by supply problems. In the coal tar products market there has been a good call for pitch and carbolic acid, while supplies generally are booked for some time ahead.

MANCHESTER.—Strong price conditions continue in virtually all sections of the Manchester market for both light and heavy chemicals. The past week has witnessed persistent pressure for contract deliveries of textile, rubber manufacturing and other industrial chemicals from users in the area and there is no lack of new inquiry. The soda compounds generally, including caustic soda, as well as bleaching powder and other chemicals, has been the subject of additional export inquiries on this market during the past week. Some classes of fertilisers, chiefly for top-dressing, are in steady demand, and plenty of buying interest is being displayed in the general run of coal-tar products.

GLASGOW.—Very little change can be recorded in general conditions in the Scottish heavy chemical market during the past week. Business has been well up to standard and orders have been received covering the whole range of products. Considerable volume of business has been transacted in the export market, particularly on such products as formaldehyde, zinc oxide, hyposulphite of soda, nitrate of potash, and other fertilisers. Prices are very firm and an increase has been noted in the case of carbon tetrachloride.

Price Changes

Rises: Aluminium sulphate (Manchester); ammonium bicarbonate (Manchester); ammonium carbonate (Manchester); copper carbonate (Manchester); lead nitrate (Manchester); magnesite; salicylic acid (Manchester).

General Chemicals

Acetic Acid.—Maximum prices per ton: 80% technical, 1 ton, £47 10s.; 80% pure, 1 ton, £49 10s.; commercial glacial, 1 ton, £59; delivered buyers' premises in returnable barrels, £4 10s. per ton extra if packed and delivered in glass.

Acetone.—Maximum prices per ton, 50 tons and over, £65; 10/50 tons, £65 10s.; 5/10 tons, £66; 1/5 tons, £66 10s.; single drums, £67 10s.; delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each. For delivery in non-returnable containers of 40/50 gallons, the maximum prices are £3 per ton higher. Deliveries of less than 10 gallons free from price control.

Alum.—Loose lump, £16 per ton, f.o.r. MANCHESTER: £16 to £16 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. MANCHESTER: £11 10s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate.—MANCHESTER: £39 10s. per ton d/d.

Ammonium Carbonate.—£37 10s. to £38 per ton d/d in 5 cwt. casks. MANCHESTER: Powder, £43 d/d.

Ammonium Chloride.—Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £19 10s. per ton. See also Salammoniac.

Ammonium Persulphate.—MANCHESTER: £5 per cwt. d/d.

Antimony Oxide.—£110 to £117 per ton.

Arsenic.—Per ton, 99/100%, £26 10s. for 20-ton lots, £31 for 2 to 10-ton lots; 98/99%, £25 for 20-ton lots, £29 10s. for 2 to 10-ton lots; 96/99% white, £21 15s. for 20-ton lots, £25 15s. for 2 to 10-ton lots.

Barium Carbonate.—Precip., 4-ton lots, £19 per ton d/d; 2-ton lots, £19 5s. per ton. bag packing, ex works.

Barium Chloride.—98/100% prime white crystals, 4-ton lots, £19 10s. per ton, bag packing, ex works.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £18 15s. per ton d/d; 2-ton lots, £19 10s. per ton.

Bleaching Powder.—Spot, 35/37%, £11 to £11 10s. per ton in casks, special terms for contract.

Borax.—Per ton for ton lots, in free 1-cwt. bags, carriage paid: Commercial, granulated, £30; crystals, £31; powdered, £31 10s.; extra fine powder, £32 10s.

B.P., crystals, £39; powdered, £39 10s.; extra fine, £40 10s. Borax glass, per ton in free 1-cwt. waterproof paper-lined bags, for home trade only, carriage paid: lump, £77; powdered, £78.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid: Commercial, granulated, £52; crystals, £53; powdered, £54; extra fine powder, £56. B.P., crystals, £61; powder, £62; extra fine, £64.

Calcium Bisulphide.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid, £5 15s. per ton, ex store.

Charcoal, Lump.—£22 to £24 per ton, ex wharf. Granulated, supplies scarce.

Chlorine, Liquid.—£23 per ton, d/d in 16/17 cwt. drums (3-drum lots).

Chrometan.—Crystals, 5½d. per lb.

Chromic Acid.—1s. 10d. to 1s. 11d. per lb., less 2½%, d/d U.K.

Citric Acid.—Controlled prices per lb., d/d buyers' premises. For 5 cwt. or over, anhydrous, 1s. 6¾d., other, 1s. 5d.; 1 to 5 cwt., anhydrous, 1s. 9d., other, 1s. 7d. Higher prices for smaller quantities.

Copper Carbonate.—MANCHESTER: £8 5s. per cwt. d/d.

Copper Oxide.—Black, powdered, about 1s. 4½d. per lb.

Copper Sulphate.—£32 5s. per ton, f.o.b., less 2%, in 2 cwt. bags.

Cream of Tartar.—100 per cent., per cwt., from £13 17s. 6d. for 10-cwt. lots to £14 1s. per cwt. lots, d/d. Less than 1 cwt., 2s. 5½d. to 2s. 7½d. per lb. d/d.

Formaldehyde.—£27 to £28 10s. per ton in casks, according to quantity, d/d. MANCHESTER: £28.

Formic Acid.—85%, £54 per ton for ton lots, carriage paid.

Glycerine.—Chemically pure, double distilled 1260 s.g., in tins, £4 to £5 per cwt., according to quantity; in drums, £3 19s. 6d. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.

Hydrochloric Acid.—Spot, 7s. 6d. to 8s. 9d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—11d. per lb. d/d, carboys extra and returnable.

Iodine.—Resublimed B.P., 10s. 4d. to 14s. 6d. per lb., according to quantity.

Lactic Acid.—Pale tech., £60 per ton; dark tech., £53 per ton ex works; barrels returnable.

Lead Acetate.—White, 57s. to 60s. per cwt., according to quantity.

Lead Nitrate.—About £53 per ton d/d in casks. MANCHESTER: £53 10s.

Lead, Red.—Basic prices, per ton: Genuine dry red lead, £60; orange lead, £72. Ground in oil: Red, £73; orange, £85. Ready-mixed lead paint: Red, £76; orange, £88.

Lead, White.—Dry English, in 8-cwt. casks, £72 10s. per ton. Ground in oil, English, in 5-cwt. casks, £83 10s. per ton.

Litharge.—£57 10s. to £60 per ton, according to quantity.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £36 per ton.

Magnesium Chloride—Solid (ex wharf), £22 per ton.

Magnesium Sulphate.—£12 to £14 per ton.

Mercuric Chloride.—Per lb., for 2-cwt lots, 9s. 1d.; smaller quantities dearer.

Mercurous Chloride.—10s. 1d. to 10s. 7d. per lb., according to quantity.

Mercury Sulphide, Red.—Per lb., from 10s. 8d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 3s. per gal.; pyridinised 64° O.P. 100 gal., 3s. 1d. per gal.

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—62s. 6d. to 65s. per cwt. £85 5s. per ton in ton lots, packed in free 5-cwt. casks. MANCHESTER: £4 to £4 2s. 6d. per cwt.

Paraffin Wax.—Nominal.

Phosphorus.—Red, 3s. per lb. d/d; yellow, 1s. 10d. per lb. d/d.

Potash, Caustic.—Solid, £65 10s. per ton for 1-ton lots; flake, £76 per ton for 1-ton lots. Liquid, d/d, nominal.

Potassium Bichromate.—Crystals and granular, 7¾d. per lb.; ground, 8¼d. per lb., for not less than 6 cwt.; 1-cwt. lots, ½d. per lb. extra.

Potassium Carbonate.—Calcined, 98/100%, £57 per ton for 5-ton lots, £57 10s. per ton for 1 to 5-ton lots, all ex store; hydrated, £51 per ton for 5-ton lots, £51 10s. for 1 to 5-ton lots.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Iodide.—B.P., 8s. 8d. to 12s. per lb., according to quantity.

Potassium Nitrate.—Small granular crystals, 76s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 8½d. per lb. for 1-cwt. lots; for 3 cwt. and upwards, 1s. 8d. per lb.; technical, £7 14s. 3d. to £8 6s. 3d. per cwt., according to quantity d/d.

Potassium Prussiate.—Yellow, nominal.

Salammoniac.—First lump, spot, £48 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £19 10s. per ton, in casks, ex store.

Salicylic Acid.—MANCHESTER: 1s. 8d. to 2s. 1d. per lb. d/d.

Soda, Caustic. — Solid 76/77%; spot, £16 7s. 6d. per ton d/d.

Sodium Acetate.—£42 per ton, ex wharf.

Sodium Bicarbonate.—Refined, spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 6½d. per lb.; anhydrous, 7½d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite. — Powder, 60/62%, £19 10s. per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2 cwt. free bags.

Sodium Chlorate.—£36 to £45 per ton, nominal.

Sodium Hyposulphite.—Pea crystals 19s. per cwt. (ton lots); commercial, 1-ton lots, £17 per ton carriage paid. Packing free.

Sodium Iodide.—B.P., for not less than 28 lb., 9s. 11d. per lb., for not less than 7 lb., 13s. 1d. per lb.

Sodium Metaphosphate (Calgon).—11d. per lb. d/d.

Sodium Metasilicate.—£16 10s. per ton, d/d U.K. in ton lots.

Sodium Nitrite.—£22 10s. per ton.

Sodium Percarbonate.—12½% available oxygen, £7 per cwt.

Sodium Phosphate.—Di-sodium, £25 per ton d/d for ton lots. Tri-sodium, £27 10s. per ton d/d for ton lots (crystalline).

Sodium Prussiate.—9d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Sulphate (Glauber Salt).—£4 10s. per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. Spot £4 11s. per ton d/d station in bulk. MANCHESTER: £4 12s. 6d. to £4 15s. per ton d/d station.

Sodium Sulphide. — Solid, 60/62%, spot, £19 2s. 6d. per ton, d/d, in drums; crystals, 30/32%, £12 7s. 6d. per ton, d/d, in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; pea crystals, £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £14 to £16 5s., according to fineness.

Sulphuric Acid.—168° Tw., £6 2s. 8d. to £7 2s. 8d. per ton; 140° Tw., arsenic-free, £4 11s. per ton; 140° Tw., arsenious, £4 3s. 6d. per ton. Quotations naked at sellers' works.

Tartaric Acid.—Per cwt., for 10 cwt. or more, £15 8s.; 5 to 10 cwt., £15 9s. 6d.; 2 to 5 cwt., £15 11s.; 1 to 2 cwt., £15 13s. Less than 1 cwt., 3s. 1d. to 3s. 3d. per lb. d/d, according to quantity.

Tin Oxide.—Nominal.

Zinc Oxide.—Maximum prices per ton for 2-ton lots, d/d; white seal, £45 15s.; green seal, £44 15s.; red seal, £43 5s.

Zinc Sulphate.—Tech., £25 per ton, carriage paid.

Rubber Chemicals

Antimony Sulphide.—Golden, 1s. 5d. to 2s. 6d. per lb. Crimson, 2s. 2d. to 2s. 6d. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Best white bleached, £8 3s. 6d. per ton.

Cadmium Sulphide.—6s. to 6s. 6d. per lb.

Carbon Bisulphide.—£37 to £41 per ton, according to quality, in free returnable drums.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—£44 to £49 per ton, according to quantity.

Chromium Oxide.—Green, 2s ped lb.

India-rubber Substitutes.—White, 6 3/16d to 10½d. per lb.; dark, 6 3/16d. to 6 15/16d. per lb.

Lithopone.—30%, £26 5s. per ton.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

Vermilion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Plus 5% War Charge.

Nitrogen Fertilisers

Ammonium Phosphate.—Imported material, 11% nitrogen, 48% phosphoric acid, per ton d/d farmer's nearest station, £20 15s.

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, in February, £10 0s. 6d., in March-June, £10 2s.

Calcium Cyanamide.—Nominal; supplies very scanty.

Concentrated Fertilisers.—Per ton d/d farmer's nearest station, I.C.I. No. 1 grade, where available, £14 18s. 6d.

"Nitro Chalk."—£9 14s. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean super-refined for 6-ton lots d/d nearest station, £15 15s. per ton; granulated, over 98%, £10 14s. per ton.

Coal Tar Products

Benzol.—Per gal. ex works: 90's, 2s. 6d.; pure, 2s. 8½d.; nitration grade, 2s. 10½d.

Carbolic Acid.—Crystals, 11½d. per lb. Crude, 60's, 4s. 3d. MANCHESTER: Crystals, 9½d. to 11½d. per lb., d/d; crude, 4s. 3d., naked, at works.

Creosote.—Home trade, 5⅞d. to 8d. per gal., according to quality, f.o.r. maker's works. MANCHESTER, 6½d. to 9⅜d. per gal.

Cresylic Acid.—Pale, 97%, 3s. 6d. per gal.; 99%, 4s. 2d.; 99.5/100%, 4s. 4d. American, duty free, 4s. 2d., naked at works. MANCHESTER: Pale, 99/100%, 4s. 4d. per gal.

Naphtha.—Solvent, 90/160°, 2s. 10d. per gal. for 1000-gal. lots; heavy, 90/190°, 2s. 4d. per gal. for 1000-gal. lots, d/d. Drums extra; higher prices for smaller lots. Controlled prices.

Naphthalene.—Crude, ton lots, in sellers' bags, £7 2s. 6d. to £10 per ton, according to m.p.; hot-pressed, £11 10s. to £12 10s. per ton, in bulk ex works; purified crystals, £25 15s. to £28 15s. per ton. Controlled prices.

Pitch.—Medium, soft, home trade, 75s. per ton f.o.r. suppliers' works; export trade, 120s. per ton f.o.b. suppliers' port. MANCHESTER: 75s. 6d. to 77s. 6d. f.o.r.

Pyridine.—90/140°, 18s. per gal.; 90/160°, 14s. MANCHESTER: 14s. 6d. to 18s. 6d. per gal.

Toluol.—Pure, 3s. 1d. per gal.; 90's, 2s. 4d. per gal. MANCHESTER: Pure, 3s. 1d. per gal. naked.

Xylol.—For 1000-gal. lots, 3s. 3½d. to 3s. 6d. per gal., according to grade, d/d.

Wood Distillation Products

Calcium Acetate.—Brown, £21 per ton; grey, £24. MANCHESTER: Grey, £24 to £25 per ton.

Methyl Acetone.—40/50%, £56 per ton.

Wood Creosote.—Unrefined, about 2s. per gal., according to boiling range.

Wood Naphtha, Miscible.—4s. 6d. to 5s. 6d. per gal.; solvent, 5s. 6d. per gal.

Wood Tar.—£5 per ton.

Intermediates and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—Nominal.

o-**Cresol** 30/31° C.—Nominal.

p-**Cresol** 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb; 66/68° C., 1s.

p-**Nitraniline.**—2s. 5d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyer's works.

Nitronaphthalene.—1s. 2d. per lb.; P.G., 1s. 0½d. per lb.

o-**Toluidine.**—1s. per lb., in 8/10 cwt. drums, drums extra.

p-**Toluidine.**—2s. 2d. per lb., in casks.

m-**Xylidine Acetate.**—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON.—June 26.—For the period ending June 29 (June 22 for refined oils*), per ton, naked, ex mill, works or refinery, and subject to additional charges according to package: LINSEED OIL, crude, £65. RAPESEED OIL, crude, £91. COTTONSEED OIL, crude, £52 2s. 6d.; washed, £55 5s.; refined edible, £57; refined deodorised, £58. COCONUT OIL, crude, £49; refined deodorised, £49; refined hardened deodorised, £53. PALM KERNEL OIL, crude, £48 10s.; refined deodorised, £49; refined hardened deodorised, £53. PALM OIL, (per ton c.i.f.), in returnable casks, £42 5s.; in drums on loan, £41 15s.; in bulk £40 15s. GROUNDNUT OIL, crude, £56 10s.; refined deodorised, £58; refined hardened deodorised, £62. WHALE OIL, crude hardened, 42 deg., £84; refined hardened, 46/48 deg., £85. ACID OILS: Groundnut, £40; soya, £38; coconut and palm-kernel, £43 10s. ROSIN: wood, 32s. to 45s.; gum, 44s. to 54s. per cwt., ex store, according to grade. TURPENTINE, American, 87s. per cwt. in drums or barrels, as imported (controlled price).

* *See* note on p. 734.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted may be obtained from the Patent Office, Southampton Buildings, London, W.C.2., at 1s. each. Numbers given under "Applications for Patents" are for reference in all correspondence up to acceptance of the complete-specification.

Applications for Patents

Polymers.—C. Arnold. (Standard Oil Development Co.) 15508.

Sulphuric acid recovery.—C. Arnold. (Standard Oil Development Co.) 15510.

Solvent extraction.—Bamag, Ltd., and B. Bregman. 15688.

Plastic resins.—F. Begley & Co., Ltd., and F. Begley. 15950.

Plasticisers.—L. Berger & Sons, Ltd. (Sherwin-Williams Co.) 15778.

Organic compounds.—Boots Pure Drug Co., Ltd., W. F. Short, and P. Oxley. 15863.

Ethers.—British Drug Houses, Ltd., W. Bradley, and F. G. Sayer. 16053.

Insulating compounds.—British Insulated Callender's Cables, Ltd., D. C. Hancock, and D. T. Hollingsworth. 15700.

Bimetallic articles.—A. F. Burgess. (S. K. Wellman & Co.) 15363.

Hydrocarbon purification.—Carnegie-Illinois Steel Corporation. 15785.

Metallurgy.—Chromium Mining & Smelting Corporation, Ltd. 15411.

Dyestuffs.—S. Coffey, F. Lodge, and I.C.I., Ltd. 15998.

Dyestuffs.—S. Coffey, F. Lodge, J. Wardleworth, and I.C.I., Ltd. 15996-7.

Organo-silicon compounds.—Corning Glass Works. 15382.

Powdered metal-material.—Crane Packing Co. 15986.

Esters.—A. J. Daly, and W. G. Lowe. 15852-3.

Heat treatment of metals.—J. B. Delany, and I.C.I., Ltd. 15790-2.

Fluorescent materials.—Derby & Co., Ltd., and H. Meyer. 15523.

Polymerisation.—E.I. Du Pont de Nemours & Co. (United States, May 22, '45.) 15485.

Ethylene interpolymerisation.—E.I. Du Pont de Nemours & Co. (United States, May 22, '45.) 15486.

Silica.—E.I. Du Pont de Nemours & Co., and R. K. Iler. 15992-3.

Silica.—E.I. Du Pont de Nemours & Co., and J. S. Kirk. 15991.

Synthetic resins.—E.I. Du Pont de Nemours & Co., D. D. Coffman, and H. W. Jacobson. 15794.

Enamelling.—A. W. Elmes, H. M. Glass, and I.C.I., Ltd. 15487.

Alcohol products.—E. Fiorillo, and A. Polgar. 15673.

Resinous polymers.—Firestone Tyre & Rubber Co. 15627.

Amines.—J. R. Geigy A.-G. (Switzerland, May 8, '45.) 15699.

Araliphatic amines.—J. R. Geigy A.-G. (Switzerland, May 8, '45.) 15984.

Rhodacyanine dyes.—General Aniline & Film Corporation. 15634.

Haloacrylic resins.—General Aniline & Film Corporation. 15633, 15635, 15637.

Acrylic compounds.—General Aniline & Film Corporation. 15636.

Haloacrylic compounds.—General Aniline & Film Corporation. 15638-40.

Acyl halides.—B. F. Goodrich Co. 15532.

Organic polysulphides.—B. F. Goodrich Co. 15533-4.

Leather filling.—D. J. Guest, D. B. Kelly, J. H. Sharphouse, H. Taylor, and I.C.I., Ltd. 15995.

Settling tanks.—C. J. Hartley. 15457.

Insecticides.—Hercules Powder Co. 15656.

Phenols.—E. B. Higgins. 15867.

Curing polymerisable materials.—A. M. Howald, J. K. Simons, and Libbey-Owens-Ford Glass Co. 15935.

Steel protection.—Indium Corporation of America. 15926.

Dicyandiamides.—T. S. Kenny, A. G. Murray, and I.C.I., Ltd. 15793.

Plastics.—T. Konaszewski, and J. A. Mikolajewski. 15609.

Polymeric materials.—J. Lincoln. 16038.

Polymers.—J. Lincoln, and J. G. N. Drewitt. 16037.

Treatment of metals.—D. MacArthur, J. V. Westwood, D. H. Napier, and United Anodising, Ltd. 15861.

Control of gas mixtures.—J. P. A. Macdonald. 15886.

Synthetic resins.—W. Engel. 15630.

Complete Specifications Open to Public Inspection

Production of crystalline unsaturated alkyd resins and copolymerisable compositions and amorphous resins therefrom. November 22, 1944. (Cognate applications 28532-3/45.) 28531/45.

Removal of cations from liquid media.—British Thomson-Houston Co., Ltd. August 11, 1942. 12813/43.

Manufacture and use of new phenoxyalkylammonium compounds. November 24, 1944. (Cognate applications 29503-4/45.) 29502/45.

Solutions of cellulosic material.—S. M. Edelstein. December 13, 1943. 16845/44.

Cyanine dyestuffs.—N.V. Gevaert Photo-Producten. October 22, 1943. 3648/46.

Electrolytic polishing of metallic surfaces.—K. T. Grubb. November 27, 1944. 31508/45.

Manufacture of an imadazolidone derivative.—F. Hoffmann-La Roche & Co., A.-G. November 20, 1944. (Cognate application 27967/45.) 27966/45.

Manufacture of 1-*d*-ribitylamino-3.4-xylol.

—F. Hoffmann-La Roche & Co., A.-G. November 24, 1944. 27968/45.

Production of polyhaloacyl halides.—Imperial Chemical Industries, Ltd. November 28, 1944. 32114/45.

Pressure-sensitive adhesives.—Johnson & Johnson (Great Britain), Ltd. November 22, 1944. 30221/45.

Process for the concentration of minerals, in particular oxidised minerals.—P. Mineur. November 25, 1944. 31911/45.

Extracting glue, gelatin, sugar stock and like material.—C. J. Mueller. March 4, 1942. 10749/46.

Process of recovering acetylene from gaseous mixtures.—National Cylinder Gas Co. November 23, 1944. 25196/45.

Storing acetylene and the like.—National Cylinder Gas Co. November 23, 1944. 25197-8/45.

Production of sulphonamides.—Soc. des Usines Chimiques Rhône-Poulenc. November 24, 1944. 28596/45.

Electro-deposition of selenium.—Standard Telephones & Cables, Ltd. November 29, 1941. 9890/43.

Catalytically dehydrogenating hydrocarbons.—Universal Oil Products Co. February 11, 1942. (Cognate application 2911/46.) 2910/46.

Stabilising of foam.—Wormald Bros. Proprietary, Ltd. November 22, 1944. 31359/45.

Gas analysis apparatus.—W. M. Zaikowsky. November 22, 1944. 26934/45.

Complete Specifications Accepted

Manufacture of dyes.—Kodak, Ltd., and E. B. Knott. March 28, 1944. 577,548.

Copper alloys.—M. Cook, W. O. Alexander, and I.C.I., Ltd. October 17, 1941. 577,597.

Purification of alkyl methacrylates.—E.I. Du Pont de Nemours & Co. July 13, 1943. 577,632.

Treatment of cellulosic pulp to reduce its viscosity characteristics.—S. M. Edelstein. April 7, 1943. 577,562.

Flocculation apparatus for the treatment of water, sewage and other liquids or liquors.—W. E. Farrer, Ltd., and W. G. Farrer. May 29, 1944. 577,517.

Means for producing citric acid by fermentation.—Ferment - Acid Corporation. January 29, 1943. 577,490.

Manufacture of basic esters of α-alkyl or α-cycloalkylaryl carbinols and of quaternary ammonium compounds formed therefrom. J. R. Geigy A.-G. September 23, 1942. 577,634.

Production of polymeric materials.—Imperial Chemical Industries, Ltd. May 24, 1943. 577,511.

Solutions of synthetic linear polyamides.—Imperial Chemical Industries, Ltd. June 10, 1943. 577,626.

Manufacture of rubber.—Imperial Chemical Industries, Ltd. June 23, 1943. 577,629.

Apparatus for the determination of the fluidity of molten metals. August 18, 1944. 577,554.

Manufacture of dyes and dye intermediates.—Kodak, Ltd., and E. B. Knott. March 28, 1944. 577,549.

Alkaloid derivatives.—May & Baker, Ltd., A. J. Ewins, J. N. Ashley, and J. O. Harris. Cognate applications 2054/44 and 484/45. March 4, 1944. 577,606.

Process for the treatment of solid materials in electrolytes.—L. N. Reddie. (Union Minière du Haut-Katanga.) October 13, 1943. 577,568.

Alkylation of organic compounds.—Texaco Development Corporation. February 24, 1943. 577,581.

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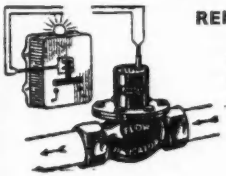
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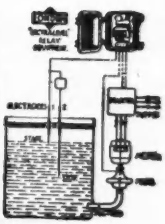
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FOUR—Enclosed Vertical Cylindrical **MIXERS**, mild steel welded construction 4 ft. 3 in. dia. by 5 ft. 6 in. high with overdriven agitator, mounted on top and driven through gearing by 3 H.P. Crompton "Klosd" surface cooled motor, 400 volts, 3-phase, 50-cycles, with starters; each mixer fitted with baffles mixing blades of the finger type; shaft supported by foot-step bearing; two bottom outlets.

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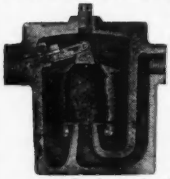

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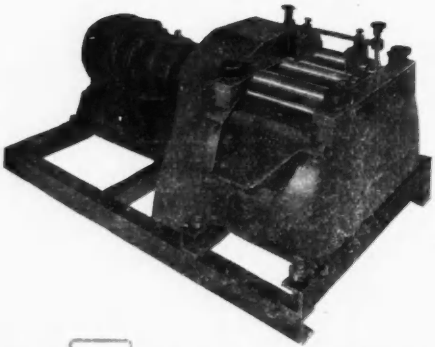

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